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Final Environmental Impact Statement

**FLOOD CONTROL
BASSETT CREEK WATERSHED
HENNEPIN COUNTY
MINNESOTA**

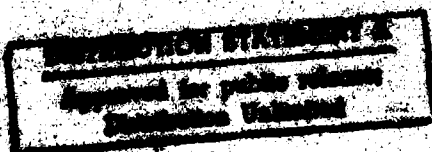
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The proposed action includes a variety of structural and non-structural measures. Structural measures involve a 1 1/2 mile underground conduit and deep tunnel, temporary storage areas, one permanent impoundment, channel modifications, embankments, floodwalls, and culverts and weirs. Non-structural measures are floodplain evacuation, flood proofing and continuation of the existing floodplain regulation and flood insurance programs. Construction would result in aesthetics loss, long-term adverse impacts on existing		

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FINAL
ENVIRONMENTAL IMPACT STATEMENT
FLOOD CONTROL
BASSETT CREEK WATERSHED
HENNEPIN COUNTY
MINNESOTA

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ST. PAUL DISTRICT
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ST. PAUL, MINNESOTA 55101
MARCH 1977

SUMMARY

FINAL ENVIRONMENTAL IMPACT STATEMENT
FLOOD CONTROL
BASSETT CREEK WATERSHED
HENNEPIN COUNTY, MINNESOTA

- () Draft Environmental Statement () Revised Draft Statement
(X) Final Environmental Statement

Responsible Office: U.S. Army Engineer District, St. Paul, Minnesota

1. Name of Action () Administrative (X) Legislative

2. Description of Action: The proposed action for the Bassett Creek Watershed includes a variety of structural and non-structural measures. Structural measures involve a 1 1/2 mile underground conduit and deep tunnel, temporary storage areas, one permanent impoundment, channel modifications, embankments, floodwalls, and culverts and weirs. Non-structural measures are floodplain evacuation, flood proofing and continuation of the existing floodplain regulation and flood insurance programs.

3 a. Environmental Impacts: Damages resulting from floods of less than the 100-year occurrence would be eliminated in various portions of the watershed. In other portions of the watershed floodplain regulation would be designed to prevent the future growth of flood damages, and flood insurance would compensate owners for damages incurred from floods.

b. Adverse Environmental Impacts: The construction of the embankments and replacement of the conduits would result in temporary noise, increased traffic, possible dust pollution, road detours, and the loss of vegetation in the immediate construction area. The channel modifications, embankments and the permanent impoundment would result in long-term adverse impacts on existing vegetation and short- and long-term impacts on aquatic ecosystems. The extended periods of inundation would temporarily affect recreational opportunities in some areas.

4. Alternatives: Both structural and non-structural alternatives were considered for the proposed project including the no action alternative and various combinations of floodwater storage, channel modifications, flood proofing, evacuation, floodplain regulation, and flood insurance. Alternatives for downstream portions of the creek considered were various routes for the underground conduit, an open channel, and an open channel-open space proposal.

5. Coordination: For a list of those who have been sent copies of the draft statement and from whom comments were requested see page 68. A list of those who commented on the revised draft statement appears on page 70.

6. a. Draft Statement to CEO 10 September 1975.
b. Revised Statement to CEO September 1976.
c. Final Statement to CEO _____.

FINAL
ENVIRONMENTAL IMPACT STATEMENT
FLOOD CONTROL
BASSETT CREEK WATERSHED
HENNEPIN COUNTY
MINNESOTA

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FINAL ENVIRONMENTAL
IMPACT STATEMENT

FLOOD CONTROL
BASSETT CREEK WATERSHED
HENNEPIN COUNTY, MINNESOTA

1.00 PROJECT DESCRIPTION

Location

1.01 The Bassett Creek Watershed is located in Hennepin County, Minnesota. The lower portion of the watershed is almost completely industrialized and urbanized while the upper portion of the watershed is relatively undeveloped. The municipalities affected by this project are Crystal, Golden Valley, Medicine Lake, Minneapolis, Minnetonka, New Hope, Plymouth, Robbinsdale and St. Louis Park.

Authorization

1.02 Authorization is provided by resolutions adopted by the Committee on Public Works of the United States Senate on 7 April 1962, and the House of Representatives, on 24 September 1970. The resolution requested, in part, that a review be made of the recommendations contained in House Document No. 669, 76th Congress, 3rd Session, and other pertinent reports, with a view to determining the advisability of modifying the recommendations contained therein, with particular reference to providing improvements in the interest of flood control and allied purposes in the Bassett Creek Watershed.

General Project Description

1.03 This section describes in detail the plan proposed to meet the water- and land-related resource needs of the Bassett Creek Watershed. The description includes physical features, accomplishments and effects of the plan and significant design and construction information. A map of the watershed is shown on Plate 1. At this time it is not possible to accurately estimate a schedule for implementation of the proposed plan. However, once the project is authorized and initially funded, it would take about 4 to 5 years to complete design and construction if subsequent funds were appropriated as needed.

1.04 The project would be designed to provide protection against a 1 percent chance flood (100-year frequency). (Plate 2 provides information on the locations, limits and types of flood control improvements proposed.) Also included in the plan are recreational bikeways and hiking trails along some portions of the creek in Minneapolis. The selected plan has average annual benefits of \$949,700, average annual costs of \$633,000, and a benefit cost ratio of 1.50 to 1 based on October 1975 price levels, a period of amortization of 100 years and a 6 1/8 percent interest rate.

Non-Structural Features

1.05 Not all reaches of Bassett Creek are subject to structural protection by the proposed plan. In those portions of the Bassett Creek Watershed which are unprotected by the structural flood control features of the plan, non-structural flood control measures are proposed.

Golden Valley Road (County Road 66) To Dresden Lane

1.06 The proposed plan would provide flood proofing, as a supplement to the base condition (floodplain regulation and flood insurance) for this reach of Bassett Creek (Mile 4.51 to Mile 4.91). A total of three residences would be flood proofed along this reach and no evacuation would be necessary. Flood proofing of these three homes, in conjunction with the base condition consisting of floodplain regulation and flood insurance, would prevent or compensate owners for future flood damages resulting from a 100-year frequency flood.

Regent Avenue To Upstream of Highway 100

1.07 The plan proposes flood proofing as a supplement to the base condition in this reach (Mile 5.83 to Mile 6.44) of Bassett Creek. A total of 16 homes would require flood proofing. Fifteen homes are located downstream of T.H. 100 and one home is located upstream of T.H. 100. The flood proofing of these 16 residences, in combination with the base condition consisting of floodplain regulation and flood insurance, would prevent or compensate owners for future flood damages resulting from a 100-year frequency flood.

Plymouth Creek Upstream Of Medicine Lake

1.08 The plan proposes no action, and the base condition consisting of floodplain regulation and flood insurance in this portion (Mile 1.98 to Mile 7.00) of the Bassett Creek Watershed would be maintained. There is no existing development within the 100-year floodplain along this reach, and floodplain regulation would prevent future flood damages.

North Branch Upstream of Louisiana Avenue North

1.09 The plan proposes no action (maintain base condition of floodplain regulation and flood insurance) along this reach (Mile 1.52 to Mile 4.36) of the North Branch. There is no existing development within the 100-year floodplain along this reach.

Sweeny Lake Branch

1.10 The base condition consisting of floodplain regulation and flood insurance would be maintained. Along the Sweeney Lake Branch (outlet to Mile 2.65), existing flood damage occurs as a result of inundation of thoroughfares, and this flood damage would not be prevented as a part of the proposed plan. Because of these flooded thoroughfares, vehicular access to several developments is impeded during flood periods. There is no existing development within the 100-year floodplain along the Sweeney Lake Branch, and floodplain regulation would prevent future flood damages in the floodplain.

Structural Features

1.11 The principal features of the proposed plan involve the use of flood storage through the watershed and a new conduit in the outlet Creek reach of Bassett Creek. To facilitate the discussion of the specific flood control features of the proposed plan, the structural flood control features will be discussed for the various reaches of Bassett Creek.

Mississippi River to Irving Avenue North

1.12 The proposed project includes a new conduit in the reach from the Mississippi River to approximately the inlet of the existing conduit (mile 1.52) along 2nd Avenue North. At the inlet to the proposed conduit, the 100-year flood discharge would be 700 cubic feet per second at a flood level of 808. The proposed new conduit from the Mississippi River to the intersection of 3rd Avenue North and Washington Avenue North would be constructed in cooperation with the Minnesota Highway Department. The proposed new conduit outfalls into the Mississippi River in the pool downstream of the Upper St. Anthony Falls Lock and Dam. This reach of the proposed conduit would consist of an 11-foot diameter tunnel through the St. Peter sandstone. The route of the proposed conduit would run diagonally from the outfall to the intersection of Portland Avenue and 2nd Street South, follow 2nd Street South and 2nd Street North to the intersection of 2nd Street North and 3rd Avenue North and then follow 3rd Avenue North to Washington Avenue North. This 4,800-foot portion of the proposed new conduit could be built solely by the Minnesota Highway Department (MHD) at a slightly increased size to carry highway storm water drainage as well as the Bassett Creek flood flows. The cost of this portion of the conduit would be shared based on peak flow rates.

1.13 That portion of the new conduit between the intersection of Washington Avenue North and 3rd Avenue North and approximately 11th Street North and Glenwood Avenue would be constructed in cooperation with the Minnesota Highway Department. The route of this portion of the conduit lies within the right-of-way of the proposed Third Avenue highway distributor. The proposed Third Avenue distributor would provide a route connecting downtown Minneapolis to the Interstate Highway system. The first cost of this cooperative conduit would be shared with the Minnesota Highway Department (MHD) based on peak flow rates. From Washington Avenue and 3rd Avenue North, approximately 850 feet along the 3rd Avenue distributor, an 8-foot diameter tunnel would be bored through the St. Peter sandstone. From that point to approximately 11th Street North and Glenwood Avenue, a 2,300-foot portion of the conduit would be surface-excavated following the excavation of the depressed highway gradeline. Along the surface-excavated portion of the route, an 8.5-foot diameter reinforced concrete pipe would be placed in the trench and backfilled.

1.14 From the intersection of approximately 11th Street North and Glenwood Avenue, the proposed conduit would follow Glenwood Avenue to the right-of-way of Interstate 94, would cross the right-of-way of Interstate 94 to 2nd Avenue North and would follow 2nd Avenue North to approximately the location of the existing conduit near Dupont Avenue North. The entire cost of this portion of the proposed new conduit would be included in the proposed flood control project. This portion of the proposed conduit consists of 3,200 feet of 8.5-foot diameter tunnel or pipe. From approximately 11th Street North and Glenwood Avenue to a point just north and west of the right-of-way of the Burlington Northern railroad tracks, the proposed conduit would be of liver plate construction through approximately 800 feet of glacial drift. From a point north and west of the Burlington Northern railroad tracks to the inlet of the proposed conduit, the conduit would be surface-excavated and placed beneath Glenwood Avenue and 2nd Avenue North.

1.15 At the inlet to the proposed conduit, an inundation flood storage area would be excavated to provide approximately 90 acre-feet of flood storage (mile 1.52 to mile 1.85). This flood storage area would require approximately 20 acres of land along the south side of Bassett Creek between the inlet of the conduit and Irving Avenue North. A wetland pond area of approximately 10 acres would result from the excavation of this area. The normal water surface of this wetland pond would be at approximately elevation 800. During periods of normal flow, Bassett Creek would flow through this wetland pond before entering the proposed conduit. The flood storage control structure would consist of a drop-inlet structure and would include a trashrack to prevent debris from entering the proposed conduit. The existing conduit would be abandoned following construction of the proposed storage area and conduit.

Irving Avenue North To Glenwood Avenue

1.16 In the reach of Bassett Creek from Irving Avenue North to a point upstream of Penn Avenue North (mile 1.85 to mile 2.45), the plan proposes approximately 3,000 feet of clearing and snagging to remove excessive natural and man-made debris from the channel and channel banks to improve the hydraulic efficiency of the channel. Clearing and snagging, as used in this report, refers to the removal of leaning trees and dead trees in the primary channel that would soon fall into the channel and the removal of snags and debris from the primary channel. In addition, man-made debris and brush would be removed. The primary channel is the portion of creek where the main flow occurs. Trees in imminent danger of falling into the channel due to exposure of the root systems by flowing water would be removed. At locations where excessive brush impedes the flow of water, the brush would be thinned.

1.17 As part of the proposed plan, it is proposed to repair and modify the upstream wing walls of the Cedar Lake bridge. The existing wing walls consist of sheetpiling with tie-backs, portions of which are in a state of general disrepair. New concrete caps would be placed on the existing sheetpiling and the tie-backs would be repaired. This repair and modification would improve the hydraulic efficiency of the entrance to the Cedar Lake Road bridge. In addition, repair would assure that these wing walls would not collapse during a flood event and restrict flow through the Cedar Lake Road bridge.

1.18 The plan proposes to remove the old Penn Avenue crossing (mile 2.35). The removal of this old crossing and the subsequent landscaping in the immediate area would improve the hydraulic efficiency of this portion of the channel and result in flood level reductions upstream.

1.19 In the reach of Bassett Creek immediately downstream of Glenwood Avenue (mile 2.61 to mile 2.81), the plan proposes approximately 1,020 feet of flood wall along the left bank of the channel to protect industries located in this area and approximately 1,020 feet of retaining wall along the right bank. As part of the construction of these walls, the channel would be enlarged by 10 feet in an area 75 feet long through this reach to pass the required flood flows. These flood walls would replace the existing walls in the reach, which are in a state of general disrepair and of insufficient height to prevent flood damage from occurring to the industries located in the area. The existing low head rock dam in this reach would be replaced by a concrete weir at the existing crest level.

Glenwood Avenue To Dresden Lane

1.20 The proposed plan would increase flood storage on the Theodore Wirth Golf Course. The flood storage control structure for this storage site would be located immediately upstream of T.H. 55 (mile 3.15) and would be located on the highway right-of-way. This flood storage control structure would consist of a pair of large-diameter culverts to pass normal and 100-year flood flows and an overflow weir pass the flood flows resulting from a storm of greater magnitude than the 100-year frequency storm. The proposed flood storage control structure would result in 100-year flood levels approximately 2 feet higher than the existing 100-year flood levels in the Theodore Wirth Golf Course area.

1.21 Just upstream of T.H. 55 in the Theodore Wirth Golf Course, a fork leaves the main channel to the east flowing under the railroad tracks and under T.H. 55 to the east of the main channel crossing. Where T.H. 55 crosses this east fork of Bassett Creek, a new culvert would be jacked under T.H. 55 as part of the proposed plan. This new culvert would assure that local runoff would not cause flooding problems on the upstream side of T.H. 55 in this area.

1.22 The flood control structure along the main channel of Bassett Creek provides increased flood storage in Theodore Wirth Park which reduces the peak flood flows to downstream reaches. As a result of the decreased peak flood flows immediately downstream of T.H. 55, the proposed 100-year flood level on Wirth Lake would be approximately 1.5 feet below the existing 100-year flood level. The normal level of Wirth Lake and the normal flows in Bassett Creek would not be affected by the proposed project.

Dresden Lane To Upstream Of T.H. 100

1.23 As a part of the proposed plan, approximately 300 feet of Dresden Lane, (mile 4.91) at the outlet to the Rice Lake area, would be raised. This road raise would be approximately 2 feet and would prevent inundation of Dresden Lane as a result of a 100-year flood event.

1.24 At its existing 100-year level, the volume in the Rice Lake storage area would be increased by approximately 15 acre-feet. It is proposed to obtain this additional flood storage volume by relandscaping the area on the north end of the lake which has formerly been used for the disposal of demolition debris consisting of chunks of concrete, earth, wooden materials and other materials commonly found in building demolition debris. Following the relandscaping of this area, it is proposed to cover this debris with a layer of earth followed by the spreading of black dirt, planting and seeding to aesthetically enhance the area and improve its compatibility with the rest of the Rice Lake natural area.

1.25 New culvert crossings are proposed at both Noble Avenue (mile 5.53) and Regent Avenue (mile 5.83). These new crossing would consist of larger culverts being placed at channel crossings. Riprap would be required approximately 25 feet upstream of the inlets and approximately 50 feet downstream of the outlets at both of these new channel crossings in order to minimize potential erosion effects due to the high velocity flows through these culverts. Ripraping consists of the placement of large stones on the side slopes of the main channel to reduce erosion. At Minnauqua Avenue (mile 5.94), the selected plan proposes the permanent removal of the Minnauqua Avenue bridge. A cul-de-sac would be constructed on Minnauqua Avenue on the east side of Bassett Creek, and the local residents would use one of several existing alternate routes to cross the creek instead of Minnauqua Avenue.

1.26 As part of the proposed plan, about 1,800 feet of Toledo Avenue and West Bend Road (mile 5.83 to mile 5.94) would be raised approximately 3 feet. This road raise would prevent inundation of these streets and insure access to the homes in this area during flood periods.

1.27 Due to existing severe stream bank erosion immediately downstream of the existing culverts under T.H. 100, the selected plan proposes to riprap the channel banks approximately 200 feet downstream of this existing crossing to minimize future erosion problems.

1.28 Immediately upstream of T.H. 100 (mile 6.46), the plan proposes a flood storage structure consisting of an earth embankment with a large diameter culvert and overflow weir. The embankment for this proposed flood storage control structure has a total length of approximately 1,700 feet and extends about 1,200 feet northward from the centerline of the main stem at this location. The maximum height of this structure is 11 feet at the point where it crosses the channel. This flood storage control structure consists of a large diameter culvert to pass normal

and 100-year flood flows and an overflow weir to pass flood flows resulting from storms of greater magnitude than the 100-year frequency storm. This flood storage control structure results in a proposed 100-year flood level approximately 3 feet above the existing 100-year flood level along the main stem upstream of the control structure. Approximately 800 feet of the channel immediately upstream of T.H. 100 would be cleared to remove natural debris and trees which are in imminent danger of falling into the creek and obstructing flood flows.

Upstream T.H. 100 to Medicine Lake

1.29 A new arch culvert crossing at Westbrook Road (mile 7.01) is proposed because the existing crossing has an insufficient discharge capacity to convey flood flows. The existing grade of Westbrook Road at the crossing would not be affected as a result of the new enlarged box culverts, however; a portion of Westbrook Road would have to be removed to install the new culverts and would be replaced upon completion of construction.

1.30 At the downstream end of the Golden Valley Country Club golf course along the main stem, a flood storage control structure consisting of an earth embankment with a culvert and an overflow weir outlet is proposed. This earth embankment is approximately 300 feet long and has a maximum height of 5 feet. The culvert through the embankment would pass normal flows and the overflow weir would pass the 100-year flood flow, as well as flows resulting from storms of greater frequency than the 100-year frequency storm. Flood storage on Golden Valley Country Club golf course would be at a 100-year flood level approximately 0.5 feet below the existing 100-year flood level. Flood storage upstream of this storage site reduces the peak flood flows entering the Golden Valley Country Club golf course area; however, the flood storage proposed on the golf course would further reduce the flood flows to downstream areas and prevent flood damages along the reach downstream.

1.31 A flood storage control structure is proposed upstream of Winnetka Avenue North (mile 9.15). This flood storage control structure would consist of an earth embankment with culvert and overflow weir. The earth embankment is approximately 90 feet long and has a maximum height of 6 feet. The culvert through the embankment would pass normal channel flows as well as a portion of the 100-year flood flow while the overflow weir will pass the remainder of the 100-year flood flow as well as those flood flows resulting from storms of greater magnitude than the 100-year frequency storm.

1.32 The flood storage control structure upstream of Winnetka Avenue North results in increased flood storage along the channel between Winnetka Avenue and T.H. 55 as well as on the Brookview Community Golf Course. The proposed 100-year flood level along the channel upstream of Winnetka and on Brookview Community Golf Course would be approximately 1 foot above the existing 100-year flood level. As a result of the increased 100-year flood level upstream of Winnetka Avenue, about 800 feet of Boone Avenue, north of T.H. 55, would be raised an average of 2 feet to prevent inundation as a result of a 100-year flood event.

1.33 A new outlet structure would be constructed for Medicine Lake and the existing structure would be removed. The new structure would consist of a 20-foot concrete overflow weir and a 360-foot overflow embankment. It would be located approximately 500 feet downstream of the existing outlet structure immediately upstream of the Minnesota Western Railway embankment (mile 12.01). By relocating the structure, increased discharge capacity can be provided at flood stages without affecting normal spring high water levels. Flood levels resulting from runoff events of less magnitude than a 20-year frequency storm would not be affected. This corresponds to an elevation of approximately 889. The proposed outlet structure would reduce the 100-year flood level on Medicine Lake approximately 0.5 foot below the existing 100-year flood level.

North Branch From Medicine Lake Road to Louisiana Avenue North

1.34 Flood control structures upstream of T.H. 100 (mile 6.46) on the main stem of Bassett Creek would result in increased flood storage in Bassett Creek Park on the North Branch of Bassett Creek. The proposed 100-year flood level in Bassett Creek Park would be approximately 3 feet above the existing 100-year flood level. This increased flood level would result in the inundation of an additional 10 acres in the park as a result of the 100-year flood event.

1.35 Enlarged culvert crossings are proposed for 32nd Avenue North (mile 0.49), Brunswick Avenue and Adair Avenue (mile 0.57) in order to prevent flood damage from occurring to residential properties upstream of this area. The proposed plan also would raise about 2,300 feet of 32nd, Brunswick and Adair Avenues to prevent inundation as a result of the 100-year flood event. These road raises would consist of a maximum road raise of 3 feet. Some channel storage would be retained upstream of 32nd Avenue North at approximately the existing 100-year flood level.

1.36 A new culvert crossing is proposed at 34th Avenue North (mile 0.80). This new crossing would consist of an enlarged culvert under 34th Avenue North and would provide flood storage in the reach from upstream of 34th Avenue North to the upstream side of Douglas Drive. The enlarged channel crossing would provide flood storage upstream to 34th Avenue North at approximately its existing 100-year flood level. A new culvert crossing is proposed at Douglas Drive (mile 0.99) where it crosses the North Branch of Bassett Creek, and Douglas Drive would be raised approximately 2 feet to prevent inundation as a result of a 100-year flood event.

1.37 A flood storage control structure would be constructed between Douglas Drive and Florida Avenue North (mile 1.05) consisting of an earth embankment with a culvert and an overflow weir. The earth embankment would be approximately 150 feet long and have a maximum height of approximately 18 feet. The culvert through the embankment would carry normal flows as well as the 100-year flood flow. The overflow weir would carry those flood flows resulting from storms of greater magnitude than the 100-year frequency storm. Upstream of this flood storage control structure, a flood storage area would be developed along the channel between the control structure and Louisiana Avenue North (mile 1.52). The proposed 100-year level in this flood storage area

would be approximately 4 feet below the existing 100-year flood level. In order to develop the required volume of storage at the required level to prevent flood damage, three residences between the control structure and Hampshire Avenue would have to be evacuated. Since one of these homes is currently owned by the city of Crystal, as a result of tax forfeiture, the evacuation would require the relocation of two families. New culvert crossings would be required as part of the selected plan as Florida Avenue (mile 1.12) and Hampshire Avenue (mile 1.29). The Georgia Avenue (mile 1.18) crossing would be removed as part of the proposed plan and a cul-de-sac would be constructed south of the creek, and local residents would have to use an alternate route to cross the creek. Between Hampshire Avenue North and Louisiana Avenue North, 1,100 feet of creek channel would be enlarged to provide increased flood storage volume at the reduced flood level. This enlargement of the channel would be through the backyards of the residents located on both sides of the channel and would remove several large willow trees along this reach.

Aesthetic And Environmental Considerations

1.38 Since the early phases of this study, many citizens of the Bassett Creek Watershed have expressed concern regarding the effects of proposed flood control plans on the aesthetic quality of the natural stream setting. Partially in response to these concerns, the structural features of the proposed plan would be subjected to beautification measures to minimize the adverse effects on the aesthetic quality of the stream environment. These proposed beautification measures would consist of rustification of all visible concrete surfaces, all earth embankments would be subjected to landscaping and planting measures to enhance their visual appearance and, at necessary locations, visual barriers consisting of wooden fences and/or shrubbery would be constructed to enhance the aesthetic qualities of the channel setting. Where the safety of the structure is not compromised and effective maintenance of the facility is not seriously affected, appropriate landscape planting (trees, shrubs, vines, and grasses) will be incorporated into the design of floodwalls, levees and dam embankments. A root free zone around structures will provide a margin of safety of at least 3 feet between the deepest expected penetration of plant roots and the basic project structure. The proposed embankment would be sodded but trees and shrubs would not be planted on them. Trees and shrubs would be planted outside of the root free zone and in areas that were required for work space and access. Landscaping features would be designed during post-authorization studies.

Recreational Considerations

1.39 In conjunction with the proposed flood control plan, recreation improvement measures would enhance portions of the project area. These measures include approximately 10,000 feet of bikeway and walk paths along the creek corridor from the inlet of the proposed conduit to Glenwood Avenue and from the proposed flood storage area at the inlet of the conduit to Bryn Mawr Meadows Park and would include a bridge over the Burlington Northern railroad tracks along the northern edge of Bryn Mawr Meadow Park.

1.40 It is proposed that access ramps be sloped at 8 percent (maximum), and compacted, crushed limestone pathways be constructed to permit use by elderly persons. Use of the bikeway or walk paths by motorized vehicles would be prohibited. The location and extent of the proposed bikeway and walk path system are shown on Plate 3.

2.00 ENVIRONMENTAL SETTING WITHOUT THE PROJECT

Introduction

2.01 The Bassett Creek Watershed, located in the east central portion of Hennepin County, encompasses more than 43 square miles and drains portions of Crystal, Golden Valley, Medicine Lake, Minneapolis, Minnetonka, New Hope, Plymouth, Robbinsdale and St. Louis Park. These municipalities have all or part of their total area located within the watershed. The population of the Bassett Creek Watershed was estimated at 87,400 during the 1970 census.

2.02 Bassett Creek is a tributary to the Mississippi River. The creek originates upstream of Medicine Lake in the sparsely developed western portion of the city of Plymouth. From Medicine Lake, the main stem meanders 12 miles through Plymouth, Golden Valley, Crystal and Minneapolis where it enters an underground conduit for the last 1 1/2 miles to the Mississippi River. The conduit outlets into the Mississippi River above the Upper St. Anthony Lock and Dam near river mile 855. The North Branch of Bassett Creek joins the main stem of Highway 100 and flows southeasterly from Plymouth through New Hope and Crystal. The Sweeney Lake Branch drains portions of Golden Valley and St. Louis Park and joins the main stem in Theodore Wirth Park near Golden Valley Road.

2.03 The Bassett Creek Watershed is located within the rapidly expanding Minneapolis-St. Paul metropolitan area. It is expected that the watershed will be completely urbanized by 1990. At present, 60 percent of the total watershed is in a state of partial or total urbanization. The state of urbanization varies from total in Minneapolis to sparse in the western portions of Plymouth. Existing wetlands and natural areas are being pressured by urban expansion.

2.04 A general understanding of the resources and developmental trends of the project area is needed to understand present and projected problems and needs of the watershed. The following discussion presents pertinent information relating to the natural resources, development and socioeconomic conditions in the watershed. The information presented provides insight for the evaluation of possible solutions to both the present and the future flooding problems in the watershed. This is an abbreviated presentation of the environmental setting. Additional information is available in the Environmental Assessment prepared by Barr Engineering Company on file at the St. Paul District Office, Corps of Engineers.

Climate

2.05 The climate of the area is moderate, characterized by large seasonal variations in temperature, normally sufficient rainfall for crops and moderate snowfall. The summers are warm and moderately humid with short periods of hot, very humid weather occasionally occurring during the summer months. The winters are usually cold and moderately humid.

2.06 Intense summer thunderstorms are common and are occasionally accompanied by tornado activity. A record summer storm recorded at the Minneapolis-St. Paul International Airport by the National Weather Service occurred in July 1951, during which a maximum wind velocity of 92 miles per hour was recorded and 2.93 inches of rain fell in a 6-hour period. Five tornadoes were reported in Hennepin County during this same storm period. Winter storms with high winds causing severe blizzard conditions occur occasionally. The worst winter storm of record occurred on January 10-11, 1975. Winds up to 60 mph and 7 inches of snow in a 24-hour period were recorded in the vicinity of the watershed. The record 24-hour snowfall at the Minneapolis-St. Paul International Airport is 16.2 inches on November 12, 1940.

2.07 The mean annual temperature for the Bassett Creek Watershed is 44°F. The mean monthly temperature varies from 12°F in January to 73°F in July. Extreme temperatures recorded were a high of 108°F on July 14, 1936, and a low of -34°F on January 1, 1936. The average date for the first autumn frost is about October 13. The average frostfree period is approximately 166 days.

2.08 Annual precipitation for the Bassett Creek Watershed averages 26 inches per year. The mean monthly precipitation varies from 4 inches in June to 0.7 inches in January. About 70 percent of the precipitation occurs during the growing season. Snowfall averages 44 inches annually and represents about 17 percent of the total precipitation. Extreme snowfall records range from 88.9 inches during the 1950-51 season to 14.2 inches during the 1930-31 season.

Soils and Geology

2.09 The surface soils throughout much of the Bassett Creek Watershed are principally in the Hayden series and are predominately found in two major associations. These associations are the Hayden - Cordova - Peaty Muck and the Hayden - Peaty Muck Association. Hayden soils are generally well drained clay loams which are moderately permeable, and have a high available moisture capacity. The Cordova soils are poorly drained, silty clay loams found in swales and on flats. The Peaty Muck soils are very poorly drained organic soils in depressions.

2.10 The topographic relief of the Bassett Creek watershed is about 210 feet. The boundary of the watershed west of Parker's Lake rises from elevation 980 to elevation 1010, west of Schmidt Lake. From this point east, the northern and southern boundaries drop to approximately elevation 800 where the creek enters the Mississippi River. The natural drainage patterns of the watershed are generally not well developed and the area is interspersed with marshland and irregular hills and knolls.

2.11 The Bassett Creek Watershed is located in the northwestern portion of a bedrock structure, underlying Minneapolis-St. Paul metropolitan area, which has a gentle slope to the southeast. The bedrock is overlain by 200 feet of glacial drift in the western portions of the watershed and approximately 25 feet in the southeastern portion of the watershed in Minneapolis.

2.12 The watershed is underlain by five major bedrock aquifers: the St. Peter Sandstone, Prairie du Chien Dolomite, Jordan Sandstone, Franconia-Galesville Sandstones and the Mt. Simon-Hinckley Sandstones. In addition, there are numerous aquifers in the glacial drift. Some groundwater from the glacial drift and the St. Peter aquifer discharge into Bassett Creek. The remaining aquifers discharge into the Minnesota and Mississippi Rivers. The groundwater in the major aquifers and glacial drift is of the calcium bicarbonate type. The concentrations of dissolved solids in the glacial drift range from 300 parts per million to 350 parts per million in the northern and southern margins. The concentrations of dissolved solids in the major bedrock aquifers range from approximately 225 ppm in the Franconia-Galesville to over 450 ppm in the St. Peter and Prairie du Chien aquifers.

Water Supply

2.13 Approximately 40 percent of the water for municipal and industrial purposes in the Minneapolis-St. Paul metropolitan area is obtained from surface water supplies and 60 percent from groundwater aquifers.

2.14 The city of Minneapolis withdraws approximately 77 million gallons of water per day from the Mississippi River for municipal and industrial purposes. In addition, the city of Minneapolis supplies Golden Valley, Crystal, and New Hope with water. Plymouth, Robbinsdale, Minnetonka, St. Louis Park, and Medicine Lake obtain their water supplies from the Prairie du Chien-Jordan or the Mt. Simon-Hinckley bedrock aquifers. The dependence on these sources for municipal and industrial supplies is not expected to change with increased future demand.

Water Quality

2.15 The Minnesota Pollution Control Agency (MPCA) has classified Bassett Creek in the Fisheries and Recreation category (2B). The 2B classification requires water of adequate quality to propagate and maintain both sport and commercial fishes as well as aquatic recreation of all kinds including swimming. A limited amount of water quality data is available for the Bassett Creek Watershed. This material is presented in Appendix A. The water quality monitoring data collected during the first year indicated that the creek did not meet the MPCA standards in the summer months. Later results of the water quality monitoring program for Bassett Creek have indicated seasonal variations in sampling parameters, with the summer months demonstrating increased fecal coliform counts which do not meet 2B standards.

2.16 Water quality information has been obtained from Medicine Lake, Sweeney Lake, Twin Lake, Wirth Lake, and Parkers Lake. This data is also presented in Appendix A. This data indicates that Twin Lake has the lowest biological productivity and could be termed the least eutrophic. Sweeney Lake has the second lowest biological productivity and is second to Twin Lake in water transparency. Past data shows that the biological productivity of Medicine Lake has been increasing at a rapid rate during the last thirty years. The overall state of eutrophication of the lake does, however, appear to be near optimum for fish production. Parkers Lake has average chlorophyll concentrations similar to Sweeney Lake, but the transparency is lower, indicating that suspended inorganic material may be contributing to the turbidity. The lake monitoring program indicates that in Wirth Lake, the decreased water transparency due to algae production could reduce the aesthetic value of the lake for park and recreation use. Wirth Lake had the highest sustained chlorophyll concentrations as well as the highest primary production and the lowest secchi disc reading of the five lakes. Based on this data, Wirth Lake could be termed the most eutrophic.

2.17 The quality of the groundwater available in the watershed is generally good. The groundwater ranges from moderately hard to hard with high iron concentrations. Recognized sources of groundwater pollution include septic tank cesspool seepage and industrial discharges. Localized contamination of the glacial drift aquifers and uppermost bedrock aquifers has been noted.

Air Quality

2.18 Air quality information is available from four air quality sampling stations in the vicinity of the watershed. There are air quality sampling stations in Wayzata and St. Louis Park which are representative of the western and central portions of the watershed. Minneapolis has numerous stations located around the central portion of the city and two stations provide data representative of the eastern portion of the watershed. The sampling stations are referred to as "high volume samplers" and collect information using wet and dry techniques which involve the use of various filtering methods as well as solution chemistry. Results from the various sampling stations were analyzed at the laboratories of the Minnesota Pollution Control Agency and are on file at the St. Paul District Office, Corps of Engineers.

2.19 The air quality standards for particulate matter were not met at one of the sampling stations during 1974. The St. Louis Park station recorded a secondary violation, exceeding the annual standard geometric mean of 60 micrograms per cubic meter by 2 micrograms per cubic meter.

Vegetation

2.20 Natural vegetation in the Bassett Creek Watershed has been greatly altered by agricultural development and increasing urbanization. With farming rapidly diminishing in the watershed, urbanization is occurring in former agricultural areas and pressures to develop existing natural areas is occurring. In addition to the forested areas, numerous wetlands were once present in the central and eastern portions of the watershed, but the majority have been drained or filled for development. The remaining wetland areas are concentrated in the western part of the watershed and some are the remnants of approximately 1,500 acres of marsh which once existed between Medicine Lake and Cedar Lake.

2.21 Floodplain vegetation is common throughout the watershed forming a narrow strip along much of the creek as well as predominating many of the low-lying undeveloped areas. The major tree species include elm, cottonwood, box elder, basswood, willow, and aspen. Mammals associated with this type of vegetation include white-tailed deer, skunk, squirrels, and mice. This area also provides habitat for waterfowl and many species of song birds. There are no known threatened or endangered species of plants in the Bassett Creek watershed.

2.22 Marsh areas are low-lying areas near the edge of lakes and along the margins of the creek itself. More than 80 percent of the original marshland has been either drained or filled to accommodate agriculture or urbanization. The remaining areas provide valuable open space. Biologically, these sites are highly productive, sustaining both plant and animal life. Waterfowl are especially dependent on these areas for food, cover, and nesting. A marsh just downstream of Medicine Lake covers approximately 25 acres and would be classified as a Type 2 wetland. Bassett Creek flows in a channel through the marsh at a level of 1 to 2 feet below the level of the marsh during most of the year. Waterfowl habitat is limited due to the lack of open water except for Bassett Creek. Birds such as bitterns, herons, teal, mallards and possibly rails would find food and cover in the marsh during brief seasonal high water periods. Other species using this area include skunk, fox, shrews, mice and many species of song birds. The existing vegetation consists predominantly of broadleaved cattails and canary grass with burreed and polygonum also being common.

2.23 Two natural areas are located in the floodplain of Bassett Creek in Golden Valley. These are the Briarwood Bird Sanctuary and the Rice Lake Nature Area. The Briarwood Bird Sanctuary is located downstream of Highway 100. This area is on the east side of the creek and is predominantly a dense stand of 6- to 9-foot tall willow. This area is enhanced by the surrounding open space. The Rice Lake Nature Area is located between Rice Lake and Bassett Creek. This area is similar in appearance to the Briarwood Bird Sanctuary, being dominated by 8-foot high willows. Both of these areas have open space benefits by contributing to the social well-being of the community, wildlife habitat value, and are an excellent use of the floodplain.

Fish and Wildlife

2.24 There are 282 species of birds, 96 species of fish, 57 species of mammals and 33 species of amphibians and reptiles in the seven-county metropolitan area. Many of these probably occur in the Bassett Creek Watershed. There are no known threatened or endangered species of fish or wildlife in the Bassett Creek watershed.

2.25 Fish and wildlife species in the Bassett Creek Watershed maintain a high degree of diversity in on-going urbanization of the area. Some of the more representative species of the area are as follows:

Mammals:	White-tailed deer, muskrat, raccoon, skunk, fox, ground squirrel, rabbits, and mice.
Birds:	Mallard, blue-winged teal, wood duck, coot, bittern, red-tailed hawk, and many species of song birds.
Fish:	Blue-gill, sunfish, black crappie, bullhead, northern pike, and minnows.
Amphibians and Reptiles:	Snapping turtle, northern water snake, eastern garter snake, northern leopard frog, and American toad.

2.26 Today's fish and wildlife resources have little resemblance to the situation which existed 100 years ago. Some species which have been eliminated from the basin include bear, cougar, timber wolf, elk and wild fowl such as prairie chicken, wild turkey and sharp-tailed grouse.

2.27 In the past, extensive filling and draining of wetlands throughout the watershed has seriously reduced waterfowl populations. At present, over 80 percent of the original wetlands in the watershed have disappeared.

2.28 Use of the watershed by birds depends on species and habitat requirements. Upland game birds include pheasant and ruffed grouse. The ruffed grouse population is limited within the watershed due to habitat requirements. Pheasants are common in the western semi-agricultural part of the watershed. Other inhabitants or migratory users are starling, pigeon, sparrow, crow, robins, bluebirds, woodpeckers, gulls, terns, falcons, osprey, and eagles.

2.29 Recent studies by Federal and State agencies indicate that over 30,000 ducks are annually produced in the Metropolitan area with mallard, blue-wing teal, and wood duck being the most common. An expanding Canada goose population annually produces about 400 goslings in the area. Migratory birds from the Mississippi Flyway begin moving into and through the Metropolitan area each spring and fall. The confluence of three major rivers in this portion of the Mississippi Flyway attracts thousands of ducks and geese to the area's marshes and lakes. Nearly 14,000 ducks have been known to over-winter on open ponds and streams in the Metropolitan area. Several hundred have been observed using open water areas along Bassett Creek.

2.30 The white-tailed deer is the only big game species remaining in the watershed. Deer are common in the wooded areas in the western part of the watershed and are occasionally seen throughout the area. Other wildlife in the area include gray squirrels, cottontail rabbit, white-tailed jackrabbit, muskrat, and red fox.

2.31 Fish populations vary from lake to lake due to the diversity and quality of habitat provided. Some of the lakes in the watershed provide bass, panfish, and some northern pike fishing. Spawning conditions in Sweeney and Medicine Lakes are good for bass and panfish and fair to good for northern pike. Medicine Lake has two maintained spawning areas for bass and northern pike on the north and west side respectively. Turtles, frogs, toads, and other species of reptiles and amphibians are frequently found in sloughs, marshes and side channels of the lakes and in Bassett Creek itself.

Historical and Archaeological Resources

2.32 In compliance with Section 106 of the National Historic Preservation Act of 1966 and Executive Order 11593, the National Register of Historic Places has been consulted and as of 1 February 1977, the only listed site which would be affected by the proposed project is the St. Anthony Falls Historic District. It has been determined by the State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation that the effect will not be adverse (see Appendix A). The National Park Service, the SHPO, and the State Archaeologist were contacted concerning the existence of cultural resources in the project area. In addition, a search was conducted of the State Archaeologist's site files, and the records of the Hennepin County Historical Society and the Minnesota State Historical Society. The only known site, a group of prehistoric burial mounds located near Medicine Lake, will not be affected by the project. Portions of the project are considered to be in areas of high archaeological potential, while other portions are in disturbed or swampy lowland areas.

A limited surface reconnaissance was conducted by Corps archaeologists in November 1975. Nothing of historic or prehistoric significance was found, although the survey was preliminary in nature. Comments from the State Archaeologist Office regarding the archaeological reconnaissance report are included in Appendix A. The report indicated areas of high archaeological potential which will be intensively tested during the Phase II, Advanced Engineering and Design studies. Temporary ponding areas which have not yet been investigated will be surveyed and tested. In addition, a professional archaeologist will be present during construction in those areas currently under asphalt or concrete which cannot be tested prior to construction. A professional archaeologist will be present during construction of the proposed underground conduit, a part of which is included in the St. Anthony Falls Historic District.

Recreation

2.33 The State Comprehensive Outdoor Recreation Plan (Minnesota Department of Natural Resources, 1974) states that the Metropolitan Area is currently, and is projected to continue to be, deficient in most recreational facilities such as swimming, camping, picnicking, athletic fields, and hiking trails. Further recreational developments are needed to supply residents with future needs.

2.34 The Twin Cities Metropolitan Area is well-endowed with natural resources having recreation potentials. Today, many locations in the metropolitan area do not have sufficient recreation space and facilities. The National Recreation Park Association has a standard of 30 acres of public open space per 1,000 people. Hennepin County including Minneapolis and some suburbs has 25 acres per 1,000 people. Overall, the metropolitan area provides 21 acres of public open space per 1,000 population. When private recreation lands are added in, the 30-acre standard is met.

2.35 There are many recreational facilities available both outside and within the Bassett Creek Watershed. The eastern portion of the watershed including the municipalities of Minneapolis, Crystal, Robbinsdale, New Hope, St. Louis Park and Golden Valley meet existing recreational needs with neighborhood parks and playgrounds located throughout these communities. In this portion of the watershed, active recreational facilities are dominant, especially in Crystal and Robbinsdale. Rapid urbanization has interfered with the planned development of passive recreation open space as well as trail or walkway systems. This problem is most severe in areas with relatively dense development as well as those where low income neighborhoods are dominant, such as the Glenwood, Harrison, the near North side and the Willard-Homewood neighborhoods of Minneapolis. In these more densely developed portions of the watershed, trails and natural areas for studying and enjoying the natural environment are few.

2.36 Trail systems within the municipalities in the eastern and central part of the watershed range from on-street routes to off-street limestone or asphalt paths. Robbinsdale and Crystal are developing an on-grade system along low traffic residential streets using direction and traffic control signs as needed to delineate and preserve the trails. Golden Valley and New Hope have a combination of on-grade with scenic links through parks or along Bassett Creek. Minneapolis provides an off-grade trail through Theodore Wirth Park as part of its continuous trail system which will circle much of the city. Inter-community trail linkage as well as connection with the Minnesota Department of Natural Resources Luce Line Trail in Plymouth is being discussed by several communities in the watershed.

2.37 Plymouth and Minnetonka occupy the western portion of the watershed and are not as urbanized as the communities in the eastern part of the watershed. Planned development of recreational facilities is in the land acquisition phase in Plymouth and Minnetonka. Existing recreational needs are being met and continued planning will anticipate and provide for future recreational needs. Both active and passive recreational facilities are being planned as well as a system for hiking and biking trails.

2.38 Special use areas such as golf courses and lakes provide year-round activities. The Brookview Community Golf Course, the Hollydale Golf Course and the Theodore Wirth Golf Course, along with Felders Golf Center, are public use facilities. The Golden Valley Country Club golf course in Golden Valley and the Minneapolis Golf Club Golf Course in St. Louis Park are private facilities. As well as providing golf in the summer months, the public courses serve a multiple-use function by providing cross-country skiing during the winter months.

2.39 Portions of three existing golf courses are in the 100-year flood plain of Bassett Creek. These courses are the Theodore Wirth Golf Course, the Golden Valley Country Club, and the Brookview Community Golf Course. Large areas of these courses are inundated during a 100-year flood, restricting their use for several days following a flood. With existing conditions, the water level in Theodore Wirth Park can be expected to be above the normal level for approximately 24 days after a 100-year flood event and for approximately 7 days following a 10-year flood event. It is anticipated the course will be playable when the water level returns to about 1 foot above normal, which would be about 7 days for a 10-year frequency flood. User rates for Theodore Wirth Course indicate approximately 200 recreation days would be lost each day the course is closed. The Golden Valley Golf Club would lose approximately 160 recreation days per day if closed, and the Brookview Community Golf Course would lose an average of 280 recreation days per day if the course were closed.

2.40 Flood levels on lakes in the watershed could restrict their recreational uses during flood periods. As a result of summer floods inundation of swimming beaches on Medicine Lake and Wirth Lake could limit swimming activity. During a 100-year flood, Medicine Lake would be above normal level for about 45 days and would be 1 foot above normal level for 5 days. Limited attendance data on the two beaches on Medicine Lake indicate average attendance during the summer to be about 200 visits per day. Approximately 80 recreation days per day the beaches are closed would be lost. The one beach on Wirth Lake would be inundated for about 4 days due to a 100-year frequency storm and approximately 377 recreation days per day would be lost.

2.41 Wirth Lake, Sweeney Lake, Twin Lake, Parkers Lake and Medicine Lake offer opportunities for fishing, boating, sailboating, canoeing and swimming. Wirth Lake serves the Minneapolis neighborhoods on the north-side which have limited access to other lakes because of transportation limitations. Sweeney Lake and Twin Lake offer limited recreational opportunity to the watershed because there is no public access to these lakes. Parkers Lake has a public access for non-motorized craft only. Although Medicine Lake has no public access, the Minnesota Department of Natural Resources is negotiating with the city of Plymouth to obtain the necessary land for a public access. The Hennepin County Park Reserve District has proposed a Regional Recreation Park for the northwestern end of Medicine Lake. The new Regional Recreation Park has been incorporated into the Metropolitan Council's Recreation Open-Space Plan. The proposed park on Medicine Lake will be the only Regional Recreation Park within the watershed.

Flooding

2.42 The areas subject to frequent flooding include residential areas in the upper watershed and industrial and commercial lands in the lower watershed. Parks, golf courses and other recreational areas throughout the watershed are also subject to frequent flooding. The larger floods

will inundate residential areas near the conduit entrance in addition to the industrial and commercial areas. Several major highways and railroads throughout the watershed will also be inundated. The large commercial and industrial area of the watershed located in Minneapolis is especially susceptible to flood damage because it is located immediately upstream of the 1.5-mile conduit which serves as an outlet for the entire Bassett Creek Watershed. Only small flows can be carried by the existing conduit without inundating the surrounding commercial and industrial development.

Floods of Record

2.43 Floods which have occurred on Bassett Creek have been a result of both summer rainstorms and spring snowmelt runoff. The large number of isolated flooding events which have occurred have been recorded in little or no detail. Residents have indicated that while most of the isolated instances of damaging floods along Bassett Creek have resulted from summer rainstorms, flooding has not been strictly limited to that cause.

2.44 A recent incident of severe flooding in the Bassett Creek Watershed occurred on April 27, 1975, as a result of a long-duration spring rainstorm. Approximately 2 1/4 inches of rain fell in a 24-hour period throughout the watershed. Although this storm approximated a 1-year frequency rainfall event, its effects were probably comparable to a 25-year frequency runoff event due to antecedent conditions. A substantial spring snowmelt ended approximately April 15 and was followed by several days of moderate precipitation. As a result of the snowmelt and a subsequent period of moderate precipitation prior to April 27, the soils throughout the watershed were in a saturated condition and much of the natural upland depression storage was full prior to the rainfall event of April 27. As a result of this storm, flood damage was incurred in Golden Valley, New Hope, Crystal and Minneapolis. A serious result of this storm was the damage incurred as a result of sanitary sewer backup into many homes in Golden Valley, New Hope and Crystal caused by excessive infiltration into wastewater collection facilities. In addition, many street intersections in the floodplain of Bassett Creek were inundated as a result of this storm.

2.45 Severe flooding occurred in the Bassett Creek Watershed on June 6, 1974, as a result of an intense summer rainstorm. Approximately 3 1/2 inches of rain fell in a 6-hour period in the western portion of the watershed, while approximately 2 1/4 inches of rain fell in that 6-hour period in the eastern portions of the watershed. The most intense portions of the storm in the western portion of the watershed approximated a 25-year frequency rainfall event. As a result of this storm, flood damage was incurred in Golden Valley, New Hope, Crystal and Minneapolis with results similar to those of the April 27, 1975 storm described above.

2.46 A more severe flood occurred in June, 1942. This flood was significant because of the damage which was incurred by the commercial and industrial establishments in Minneapolis. If a flood of this magnitude were to occur at this time, damages of approximately \$1.6 million would occur in Minneapolis and damages of approximately \$470,000 would be sustained throughout the remainder of the watershed.

2.47 On September 5, 1903, severe flooding occurred in Minneapolis in the area of the conduit inlet¹. Reportedly, five inches of rain fell in ten hours causing extensive flooding along Bassett Creek in North Minneapolis. Bassett Creek "overflowed its banks and some four hundred acres in the center of the city were flooded".² As the flood receded and "for weeks afterwards, the heavy fog and stench arising from this entire section, due to the decay [of] vegetation was intolerable and must have been injurious to public health".³ While this is the only information available regarding this flooding event, it is apparent that the impact of this event on the residents of Minneapolis was significant.

Flood Damages

2.48 Present flood damages include both tangible and intangible losses. Tangible losses suffered during floods include inundation damage to structures, utilities and transportation facilities, flood fighting costs, post-flood cleanup costs, business losses and increased expenses for normal operating and living during a flood situation. Intangible losses suffered include loss of life, human misery during a flood occurrence, disruption of normal community activities, potential health hazards from contaminated water and food supplies, dislodged fuel storage tanks and flooding of sewer collection facilities.

2.49 Without flood protection in the Bassett Creek watershed, all tangible and intangible flood losses now occurring could occur on an increased scale in the future. With increased urbanization of the watershed, flood damages will gradually increase at a rate proportional to the growth of existing developments including: repairs and improvements, increase in property values, structural replacements and increased runoff. Future urban renewal programs and continued residential and commercial development in the floodplain are subject to floodplain regulations which require flood protection to the 100-year flood level. Future improvements and structural replacements are also permitted under floodplain regulations which require them to be protected against flooding. Therefore, new development in the floodplain and structural alterations and replacements of existing structures would have a minimal contribution to future flood losses.

1 (Report on the Feasibility of Diverting Bassett Creek Through the Lakes to Minnehaha Falls, 1904)

2. Ibid

3. Ibid

2.50 The value of the contents of the structures would also increase with time. Due to the floodplain regulations now being promulgated, vacant land in the floodplain could be used for recreational purposes in the future instead of commercial and residential development as indicated in table 3, Present and Future Land Use in the 100-Year Floodplain. The estimated flood damage that could be expected to result from a 100-year flood in the Bassett Creek Watershed is presented in table 1. As a result of the 100-year flood, damages occur to 222 residences and 18 businesses throughout the watershed.

TABLE 1
ESTIMATED FLOOD DAMAGES IN THE
BASSETT CREEK WATERSHED

<u>Damage Category</u>	<u>October 1975 Prices</u>	
	<u>100-Year Flood Existing Urbanization</u>	<u>100-Year Flood Ultimate Urbanization</u>
Residential	\$1,162,500	\$1,487,000
Commercial-Industrial	1,669,200	1,733,000
Public	707,800	474,000
TOTAL DAMAGE	\$3,539,500	\$3,694,000

Existing Flood Control Projects

2.51 There are no existing Federal flood control projects located in the Bassett Creek Watershed. Fixed control structures on Medicine Lake, Sweeney Lake and Northwood Pond maintain normal water levels and provide substantial amounts of flood storage at their 100-year flood levels. In addition, the existing crossings of Bassett Creek restrict flood flows and significantly reduce major flood peaks downstream. The 1.5 mile conduit in Minneapolis which serves as the outlet for the entire Bassett Creek Watershed was constructed in a piece-meal fashion from the Mississippi River to its existing inlet. Portions of the tunnel were constructed prior to 1900 and its cross-sectional area changes many times throughout its length, restricting the discharge capacity and providing obstructions for the accumulation of debris. Only small flows can be carried by the existing conduit without inundating the commercial and industrial development in the area of the inlet. The existing conduit is in a state of general disrepair. In the concrete portions of the tunnel, there are several areas where the reinforcing steel has been exposed by the deterioration of the concrete surfaces. Where the conduit is constructed of sandstone block, the mortar joints have deteriorated. Failure of any section of the conduit during a large flood or the accumulation of debris would further reduce the discharge capacity of the conduit, causing flooding in the area of the conduit entrance.

Public Health And Safety

2.52 The health and safety of residents in the flood area are potentially affected during major flood periods. No flood-related deaths are known to have occurred, but a serious threat to life is always present during flood periods due to flooded residences and the related potential for electrical shocks and injurious falls due to attempted movement along flooded thoroughfares. Other threats to public health and safety include impediment of local traffic, vermin from flooded areas, contamination of private water supplies, damage to wastewater collection facilities, and increased disease vector production during a major flood. Isolation of areas by flood waters could also create hazards in terms of supplying emergency medical, fire or law enforcement services. The potential for a fuel spill in the vicinity of the conduit inlet is always present during major floods due to the possible dislocation or damage to fuel storage tanks located in the area.

Land Use

2.53 The Bassett Creek Watershed occupies an area of approximately 38.5 square miles on the western edge of the rapidly expanding Minneapolis-St. Paul metropolitan area. At the present time, approximately 60 percent of the watershed's total area is in a state of total or partial urbanization. The state of urbanization varies from total in Minneapolis to negligible in the western portions of Plymouth. In those communities which have experienced considerable growth within the last fifteen years, the contemporary patterns of land utilization are apparent. Although many of these areas can be considered fully urbanized, the density of residential, commercial and industrial developments is far less than that in Minneapolis. Further west in the communities of Minnetonka and Plymouth, the density of urban development becomes even less and urban planning to retain more park and open space is underway in anticipation of future growth.

2.54 The rapid growth of development in the Bassett Creek Watershed is easily seen by comparing the current extent of development with that found on old aerial photographs and maps of the area. At the current rate of growth, it can be expected that the watershed will be in a state of ultimate urbanization by 1990.

2.55 Commercial and industrial development is distributed throughout the Bassett Creek Watershed. As urbanization has progressed westward through the watershed, commercial and industrial areas have developed along major highways and rail transportation facilities. Retail shopping centers are distributed throughout the watershed and provide convenient and diversified shopping locations for the residents of the watershed.

2.56 A land use study of the Bassett Creek Watershed has been made using current land use zoning maps, recent aerial photographs and field verification procedures. The results of this land use survey are contained in table 2. Of the 24,615 acres of the watershed, approximately 31 percent or 7,710 acres are presently undeveloped. The primary land use is residential, comprising approximately 40 percent of the total watershed area. Commercial and industrial land use comprises approximately

13 percent or 3,240 acres of the watershed. Lands for parks, open space, public and semi-public use accounts for approximately 11 percent or 2,600 acres of the watershed area and approximately 1,320 acres or 5 percent of the total area within the watershed is occupied by open water.

2.57 Approximately 11 percent of the total area or about 2,685 acres are within the 100-year floodplain. The floodplain land uses are: residential, 21 percent; commercial-industrial, 9 percent; parks, open space, public and semipublic, 20 percent; open water, 40 percent; and undeveloped land, 10 percent. The present land use within the 100-year floodplain is summarized in table 3.

2.58 The future land use in the Bassett Creek watershed has been projected based on existing municipal land use plans and is summarized in table 2. The primary future land is residential comprising about 61 percent or 14,875 acres of the watershed. Residential land use will, therefore, increase by approximately 5,130 acres under future conditions. The second largest future land use is commercial-industrial which comprises approximately 4,725 acres or 19 percent of the watershed area. This represents an increase of approximately 1,500 acres from present land use. The future land use in the park, open space, public and semi-public category will be approximately 3,695 acres or 15 percent of the watershed area. Thus, it is projected that the land for parks, open space, public and semi-public use will increase by approximately 1,100 acres. Table 3 summarizes the projected future land use in the 100-year floodplain according to existing municipal land use plans. It may be possible for much of the vacant land in the watershed to remain open space instead of being developed. This is due to floodplain regulations now being considered in the watershed. Therefore, future use of vacant land could either remain open space or be developed in compliance with floodplain regulations.

TABLE 2
PRESENT AND FUTURE LAND USE IN THE
BASSETT CREEK WATERSHED

<u>Land Use Category</u>	<u>Present Land Use Acres</u>	<u>Future Land Use Acres</u>
Residential	9,745	14,875
Commercial-Industrial	3,240	4,725
Parks, Open Space, Public, Semi-Public	2,600	3,695
Open Water	1,320	1,320
Undeveloped	<u>7,710</u>	<u>0</u>
TOTAL	24,615	24,615

TABLE 3
PRESENT AND FUTURE LAND USE IN THE
100-YEAR FLOODPLAIN

<u>Land Use Category</u>	<u>Present Land Use Acres</u>	<u>Future Land Use Acres</u>
Residential	570	700
Commercial-Industrial	235	315
Parks, Open Space, Public, Semi-Public	540	610
Open Water	1,060	1,060
Undeveloped	<u>280</u>	<u>0</u>
TOTAL	2,685	2,685

Human Resources

2.59 The Bassett Creek Watershed lies entirely within Hennepin County, one of seven counties within the Minneapolis-St. Paul metropolitan area. The Metropolitan Council independently compiles census data and forecasts population, employment and number of households for each municipality within the seven-county metropolitan area. Hennepin County is within the Minneapolis-St. Paul Standard Metropolitan Statistical Area (SMSA) which includes five of the seven counties in the Minneapolis-St. Paul metropolitan area. The 1972 OBERS Series E Projections provide population, employment and income projections for the Minneapolis-St. Paul SMSA.

2.60 The 1970 estimated population for the Bassett Creek Watershed was 87,400. Population density varies widely throughout the watershed, but averages 3.2 people per acre. Average 1970 population density in the Minneapolis-St. Paul SMSA was 1.3 people per acre. This indicates that the Bassett Creek Watershed is significantly more urbanized than the Minneapolis-St. Paul SMSA. That portion of the watershed located in Minneapolis is the most densely populated, averaging 9.6 people per acre, while Plymouth is the most sparsely populated, averaging less than 1 person per acre.

2.61 The historic and projected population data for the watershed are summarized in table 4. Between 1960 and 1970, the population in the Bassett Creek Watershed increased 28.2 percent. The watershed's population was estimated to be 92,600 in 1974 and represents an increase of 5.9 percent since 1970. The population of the Bassett Creek Watershed is projected to increase at a declining rate through the year 2030. The estimated population for the watershed by the year 2030 is 122,000 and represents a 40 percent increase from 1970. This results in an average density of 4.4 people per acre in the watershed by 2030. The Minneapolis-St. Paul SMSA is projected to experience a greater population increase than the watershed since the SMSA will experience continued urbanization through 2030, whereas the Bassett Creek Watershed is expected to be totally urbanized by 1990, based on current development trends.

3.00 RELATIONSHIP OF THE PROPOSED ACTION TO LAND USE PLANS

3.01 The proposed flood control project would provide 100-year flood protection for the Bassett Creek Watershed in Hennepin County, Minnesota. The Bassett Creek Watershed contains part or all of nine municipalities and is located in the east central part of Hennepin County. The existing state of urbanization varies from nearly total in the eastern portion of the watershed to sparse in the western portion of the watershed. Virtually all of the watershed lies within the Metropolitan Council's urban development plan and is, therefore, expected to be in a state of total urbanization by 1990.

TABLE 4
HISTORIC AND PROJECTED POPULATION

	<u>1950</u>	<u>1960</u>	<u>1970</u>	<u>1974</u>	
Bassett Creek Watershed	53,100	67,200	87,400	92,600	
Minneapolis- St. Paul SMSA	1,151,656	1,482,030	1,821,718	1,953,800	
Minnesota	2,997,000	3,413,864	3,822,000	---	
United States	151,236,548	179,323,175	203,857,864	---	
	<u>1980</u>	<u>1990</u>	<u>2000</u>	<u>2020</u>	<u>2030</u>
Bassett Creek Watershed	98,200	104,500	112,000	121,000 ¹	122,000 ¹
Minneapolis- St. Paul SMSA	2,095,000	2,455,000	2,760,000	3,284,000 ¹	3,500,000 ¹
Minnesota	1,119,400	---	4,900,700	5,496,700	5,780,000
United States	223,532,000	---	263,830,000	297,146,000	---

1 Extrapolated

Sources: Bureau of Census, Department of Commerce, 1950, 1960, 1970.
Population Forecasts (Preliminary), Metropolitan Council, October, 1974.
OBER Projections, Office of Business Economics, Department of Commerce,
April, 1974.

3.02 Many reaches of Bassett Creek are currently in a state of almost complete development, however, single residential lots or single commercial sites may still remain within the 100-year floodplain. Those reaches of the Bassett Creek watershed which are subjected to structural flood control measures are the same reaches which are almost completely developed at this time. The purpose of the proposed action is to provide flood control for these reaches of the the watershed which have been developed in the past irrespective of the flood damage potential. The proposed flood control plan also considers the protection of future as well as existing developments in the floodplain. Since all of the municipalities within the watershed have adopted or are in the process of adopting floodplain regulations which regulate future development within the 100-year floodplain, it is not anticipated that the proposed action would have any determinable effect upon the land use plans within the reaches subjected to structural flood control measures.

3.03 In those reaches of the Bassett Creek Watershed in which no action is proposed, the base condition consisting of floodplain regulation and flood insurance would be maintained and the proposed project would not result in any conflict with the existing land use plans of the respective municipalities. The municipalities have already or are in the process of zoning these lands as floodplain under the 1969 Flood Plain Management Act, and as such, these lands will be preserved for developments which take into consideration the flood damage potential.

3.04 The State Planning Agency and Metropolitan Council have reviewed the proposed project and their comments and concerns have been considered in the selection of a final plan. Letters of comment are included in the comment section of this statement.

3.05 The Twin Cities Level B Study is a reconnaissance-level evaluation of water and related land resources in the seven-county Metropolitan area. The Study's overall goal is to promote and enhance the quality of life in a 2,968 square mile area with a population of more than 2 million people. The Study will achieve this goal by: (1) identifying the water and related resource problems and needs as perceived by the area's residents and, (2) reflecting attitudes and preferences in the measures or alternatives proposed to satisfy those problems and needs. Twelve major problem areas have specifically been identified by the Twin Cities Level B Study team as areas for which recommendations will be developed. Included as recommended plans are: a study of localized flooding problems along Metropolitan area streams and creeks; protection of wetlands; and use of floodplains for open space. The Level B study recognizes that Bassett Creek has been the subject of much study effort and hence will monitor this planning process and draw input from the Bassett Creek efforts in making recommendations on other streams in the area. Implementation of Level B findings will be conducted in Level C studies. For the Bassett Creek area these findings would be implemented by the Bassett Creek Flood Control Commission.

4.00 ENVIRONMENTAL IMPACT OF THE PROPOSED ACTION

4.01 If the proposed flood control project is authorized, the implementation of the project could be anticipated to cause environmental, social, and economic impacts. This section discusses the impacts as they would be anticipated to occur.

Impacts On The Existing Environment

4.02 Since the proposed action is a combination of numerous structural and nonstructural features in various reaches of Bassett Creek, the impacts on the natural environment are discussed in the following paragraphs on a reach by reach basis.

Mississippi River to Irving Avenue (Mile 1.85)

4.03 The route followed by the proposed conduit is through an area of existing commercial and industrial development and, therefore, the impacts on the natural environment are not expected to be great. That portion of the proposed conduit between the Mississippi River and the intersection of 2nd Street North and 3rd Avenue North would be constructed underground as a tunnel in the St. Peter Sandstone. The Minnesota Highway Department would construct this tunnel for highway drainage purposes and the tunnel would be slightly oversized to carry the Bassett Creek flows. The construction of this drainage tunnel is not anticipated to result in any significant adverse or beneficial impacts on the natural environment. The Highway Department is preparing a Section 4(f) statement on the possible effects of highway drainage projects on the St. Anthony Falls Historic District.

4.04 That portion of the conduit from the intersection of 2nd Street North and 3rd Avenue North to approximately Glenwood Avenue and 11th Street North would be constructed in the right-of-way of the proposed 3rd Avenue highway distributor at the time of highway construction. From approximately Glenwood Avenue and 11th Street North to the inlet of the existing conduit, the proposed new conduit would follow the existing street right-of-way along Glenwood Avenue and 2nd Avenue North and, therefore, would not result in any adverse or beneficial impacts on the natural environment.

4.05 The environmental and cultural impacts of the Highway Department project will be discussed in an environmental impact statement prepared by the Highway Department. The Highway Department feels that the highway drainage would not have a significant effect on Mississippi River water quality and that rapid mixing rates in the Mississippi River would result in minimal effects on river water quality. The highway drainage tunnels would be lined and are not expected to have any long-term impacts on groundwater level or quality. Short-term effects on groundwater level may be expected during construction if the tunnel is below the water table and pumping activities are needed.

4.06 The non-cooperative portion of the conduit, the tunnel to be constructed by the Corps of Engineers, would be a lined tunnel and would have no long-term effects on groundwater level or quality. Short-term effects would occur during construction due to pumping activities.

4.07 Diversion of Bassett Creek through the proposed new conduit would create a barrier to upstream movement of fish and other aquatic organisms. The fish barrier would be intentionally created by using a steeply sloping section of the conduit or a drop structure in the conduit to prevent the migration of fish through the conduit. According to the Minnesota Department of Natural Resources, preventing the migration of rough fish from the Mississippi River into the Bassett Creek Watershed would be desirable because of the growing magnitude of the rough fish problem throughout the metropolitan area. Although some more desirable fish species would also be prevented from migrating through the conduit into the creek, the long-term benefits which could result from rough fish reduction and the subsequent reduction in the habitat competition for the more desired species is anticipated to enhance the watershed's sport fisheries. However, before existing populations of rough fish would be reduced, other measures would have to be undertaken in the watershed.

4.08 The construction of the flood water storage area in the vicinity of the proposed conduit inlet would involve the excavation of approximately 200,000 cubic yards of earth to provide approximately 90 acre-feet of inundation flood water storage at the proposed 100-year flood level. Specific sites for the disposal of excavated material would be designated during post-authorization studies. During periods of normal flow, a wetland pond of approximately 10 acres with an average depth of about 1 foot would occupy a portion of this flood storage area. The pond would have a volume of approximately 10 acre-feet and is anticipated to have a hydraulic flush time of a week or less during normal flow periods. It is anticipated that this wetland pond would be developed as a Type 4 or Type 5 wetland under the Fish and Wildlife Services' wetland classification. Normal groundwater levels and groundwater quality in the area of the conduit entrance would not be significantly affected by the construction of this wetland pond. The proposed 100-year flood level in the storage area would be approximately 4 feet below the existing 100-year flood level in the area. During the construction of this inundation flood storage area, and for approximately six months after, a reduction in the water quality, due to erosion, can be expected. Following construction, the water quality of the pond is anticipated to be similar to that of Bassett Creek as it enters the pond. The construction of this flood storage area would result in a severe adverse effect to, if not complete destruction of, the existing aquatic environment in the 1,500 feet of the creek between the inlet of the existing conduit and Irving Avenue North. The existing fish habitat in this reach supports a variety of small minnows and rough fish. Following the construction at the site, the aquatic environment would, over time, reestablish itself, although the ecological system would be one of a Type 4 or Type 5 wetland pond rather than a confined stream channel. Construction of the flood water storage area at the conduit inlet would disrupt approximately 20 acres of undeveloped land. Approximately 8 acres of this area is covered with large piles of demolition debris consisting of bricks, concrete and timbers. About 2 acres of the site consists of the remains of building slabs and foundations. The remaining 10 acres of the site is open field with scattered trees, which at one time was

is a hill area. Animals and birds that could be displaced or destroyed as a result of construction would include rabbits, mice, rats, moles, shrews, blackbirds, grackles and several species of song birds. Existing vegetation includes trees such as box elder and cottonwood and herbaceous species such as thistle, white campion, goldenrod and other common herbs. Following construction, landscaping, planting, sodding, and seeding would provide enhanced wildlife habitat in the 10 acres of filled area as well as soil erosion stabilization. The proposed inundation area and wetland pond would provide habitat for limited numbers of waterfowl, marsh birds, song birds, and various species of small mammals, reptiles and amphibians. The wildlife habitat in the area would be enhanced by the removal and covering of demolition debris with the excavated earth. Subsequent recreational use could have an adverse impact on the wildlife habitat.

Irving Avenue North to Glenwood Avenue (File 1.85 to File 2.81)

4.09 Clearing and snagging in the channel between Irving Avenue and Glenwood Avenue would cause a disruption of the aquatic environment as man-made and natural debris would be removed from the creek. The duration of the effects of clearing and snagging on the aquatic environment and on water quality in the creek would extend through construction and for the period following construction necessary for most of the stream biota to reestablish themselves. Some species of aquatic organisms would take years to return to the area. The water quality would be temporarily reduced due to the disruption of bottom sediments during construction. The clearing and snagging operation along the channel in this reach would result in destruction of terrestrial vegetation to allow equipment access to the creek. Birds and other wildlife in the area may be temporarily disrupted, but habitat would remain relatively undisturbed for the species presently occupying the area. Aquatic flora would be disturbed during the clearing and snagging operation; however, this effect would be minimal due to the sparse growth of aquatic vegetation along this reach. As a result of the clearing and snagging, existing aquatic microorganisms would be subjected to disruptions and modifications. In areas where riprap is proposed, the aquatic organisms that move into the area may be of a different species than those that existed before the project because of the change in substrate. The aesthetics of this reach would be enhanced due to the removal of considerable man-made debris (litter).

4.10 Clearing and snagging and other channel modifications could be expected to have at least temporary effects on aquatic organisms. These result from the loss of habitat and the disruption of the channel. The species of fish present at this time probably would not change, but there could be a decline in populations in the immediate area resulting from the construction. Other aquatic organisms would be disrupted or destroyed. Different species may repopulate the area, especially in areas where the substrate was disturbed, such as riprapped sections.

4.11 Removal of the old Penn Avenue crossing would require destruction of some vegetation in the area of the crossing. The vegetation which would be affected would consist primarily of turf and grass areas. Brush and some medium sized boxelder and elm trees (6-to 8-inch diameter) would have to be removed to facilitate the demolition operation. Landscaping and beautification measures would help restore the area following the demolition operation. Fish and other aquatic organisms would be subjected to temporary disruption during the demolition operation. The water quality would be reduced during the demolition operation due to the unavoidable increase in erosion and the debris which would enter the creek during the demolition process, however, no long-term adverse effects on the water quality of the creek would result from this action.

4.12 The construction of the flood wall and a retaining wall in the reach immediately downstream of Glenwood Avenue and the associated channel widening would have long-term adverse impacts on the vegetation and wildlife in the area. Several elm and cottonwood trees of various sizes would be removed from the bank of the creek during the construction of the retaining wall. The channel widening would eliminate some wildlife habitat in the area of construction. Approximately 1/2 acre of wildlife habitat would be permanently destroyed as a result of the channel widening and wall construction. This figure and subsequent acreage figures do not include the area occupied by the structure but do not include the access and work space that would be required. The aquatic habitat of fish and aquatic invertebrates would be disrupted and destroyed during construction. The construction of the walls and channel widening would cause a reduction in the water quality of the creek as a result of increased erosion potential and excess turbidity problems. The construction of walls in this reach would reduce the long-term erosion potential in this reach due to the existing conditions. The existing channel walls are in a state of general disrepair and are collapsing in several locations along this reach. As these existing walls deteriorate, stream bank erosion is occurring and would continue to occur in the future without maintenance or the construction of the proposed walls. Thus, over the long-term, the construction of the proposed walls would reduce erosion and turbidity problems along this reach.

Glenwood Avenue to Dresden Lane (Mile 2.81 to Mile 4.91)

4.13 The proposed flood storage control structure upstream of T.H. 55 would consist of two large culverts and an overflow weir to provide increased flood storage on Theodore Wirth Golf Course. This control structure would be located in the right-of-way of T.H. 55 and would occupy less than 1/4-acre of land. The existing wildlife habitat at the location of the control structure would be destroyed during the construction of the control structure; however, long-term effects of this disruption would be minimized through landscaping and restoration following construction. The 100-year flood level on Theodore Wirth Golf Course would be increased by approximately 2 feet, adding approximately 15 acres to the 100-year floodplain. The increased area of inundation on Theodore Wirth Golf Course would result in temporary disruptions of wildlife habitat during flood periods.

Since it is expected that the water level through the golf course would return to a level of about 1 foot above normal within 7 days following a 100-year flood event, no long-term effects on the wildlife habitat or the existing plant succession are anticipated. The increased flood storage on the golf course would result in the closing of the course for about two additional days over existing conditions. Approximately 15 additional acres of the course would be subject to inundation.

4.14 To provide additional drainage for local stormwater, a new culvert crossing would be provided at T.H. 55 along the eastern branch of the creek. This reach of the creek currently has undesirable water quality due to water stagnation. This new culvert would tend to improve the existing water quality by providing more flow through the area during periods of normal flow.

4.15 The increased flood storage on Theodore Wirth Golf Course would result in reduced flood levels along the creek downstream of T.H. 55. As a result, the existing 100-year flood level on Wirth Lake would be decreased approximately 1.5 feet. The normal water level of the ponds in Theodore Wirth Golf Course would remain unchanged as a result of the proposed flood control structure and new culvert crossing at T.H. 55.

4.16 Normal groundwater levels would not be affected by increased flood storage on Theodore Wirth Park; however, groundwater levels during flood periods would be higher than normal for several additional days following flood periods. However, because of the short periods of inundation, average annual recharge to deeper aquifers would not change.

Dresden Lane to Upstream T.H. 100 (Mile 4.91 to Mile 6.46)

4.17 Between Golden Valley Road and Dresden Lane, three residences would be flood proofed as a part of the proposed action. During the construction of these flood proofing measures, temporary disruption of the natural environment would occur; however, no long-term effects on the natural environment are expected to result due to these flood-proofing measures. Some methods of flood proofing include: small embankments; raising the lawn; closing off walk-out basements; or raising the house. As part of the proposed action Dresden Lane would be raised approximately 2 feet. Sodding in construction areas would reduce some of the visual impacts of the flood proofing and road raises. Adverse effects of road raises would be the short-term impacts of noise and air pollution associated with road construction. Long-term impacts would in most cases be the visual effects of a raised roadway, or in some cases, access may be more difficult.

4.18 Approximately 15 acre-feet of additional flood storage would be provided around Rice Lake through removal of the demolition debris at the north end of the lake. This would provide an increase in the existing storage volume on Rice Lake without an increase in the existing flood level. Covering of the demolition debris at the north end of Rice Lake would improve the aesthetic qualities of the area. Restoration and beautification measures would further enhance this natural wetland.

area. As the vegetative cover establishes itself, wildlife habitat would be enhanced on the periphery of the wetland area. The Rice Lake Nature Area and surrounding open space should benefit from these measures and these measures would not substantially change the existing land use.

4.19 Between Noble Avenue and T.H. 100, 15 residences would be subjected to flood proofing modifications. There would be adverse impacts on the existing environment during the construction of these flood proofing modifications; however, no long-term effects would result. The road raises along Toledo Avenue and West Bend Road would be constructed in a manner which would minimize the adverse effects to the existing environment.

4.20 Upstream of T.H. 100 the construction of an embankment and flood control structure would cover approximately 2 acres of land. This embankment would be approximately 1700 feet long located on the south and east side of Bassett Creek Park. There would be no long-term adverse effects on aquatic organisms due to the construction of this flood control structure and embankment. There would be adverse effects on the water quality of the creek due to erosion potential of the embankment during construction. Turbidity would increase during and after construction activities. The embankment would destroy some small to medium sized trees and brush and grass areas presently existing. Following the construction of this embankment, sodding and other beautification measures would help reduce the long-term adverse effects on the aesthetic quality and wildlife habitat of the area. Remaining long-term impacts would result from the visual effects of the embankment. This flood control structure increases the 100-year level upstream of T.H. 100 by approximately 3 feet and increases the area within the 100-year floodplain by 10 acres along this reach of the main stem.

4.21 The construction of the flood control structure would require temporary dewatering during construction; however, groundwater levels would return to normal shortly after construction. Groundwater levels would be higher than normal for several additional days following flood periods because of the increased flood level on Bassett Creek Park; however, because of the short periods of inundation, average annual recharge to deeper aquifers would not change.

4.22 About 800 feet of clearing and snagging are proposed immediately upstream of the flood control structure and highway 100. The clearing would be confined to the channel and would remove trees that have fallen into the channel or are leaning and have exposed root systems and are in immediate danger of falling into the channel. The clearing would have adverse impacts on aquatic organisms by removing their habitat and reducing the future production of microorganisms in the cleared area. Clearing natural debris from the channel would adversely affect the aesthetic qualities of the creek.

upstream of T.H. 100 to Medicine Lake (Mile 6.46 to Mile 12.01)

4.23 A restrictive flood control structure consisting of an arch embankment, culvert and overflow weir would be constructed on Golden Valley Country Club Golf Course and would occupy approximately 1/3-acre of land. This flood control structure would provide a flood storage area on Golden Valley Country Club Golf Course at approximately 0.5 foot below the existing 100-year flood level. Landscaping, plantings and other beautification measures would reduce the long-term effects on the aesthetic quality of the area. The aquatic and terrestrial environment would be destroyed along the portion of the channel which is covered by the embankment. Riprap downstream of the structure would minimize erosion problems which could occur during flood periods due to operation of the overflow weir. Aquatic organisms which become established after construction would probably be different from those which existed previously because of the change in substrate in the riprap areas. During the construction of the embankment, the water quality and aquatic organisms of Bassett Creek would be adversely affected or destroyed. However, no long-term effects on the water quality are anticipated.

4.24 Immediately upstream of Winnetka Avenue, a restrictive flood storage control structure would be constructed which would occupy approximately 1/6-acre of land. This flood control structure would result in a 100-year flood level upstream approximately 1 foot above the existing 100-year flood level and would increase the existing floodplain area. This would result in approximately 35 acres of additional land in the 100-year floodplain upstream of the structure. The aquatic environment would be destroyed along the portion of the channel which is covered by the embankment and culvert. The existing terrestrial environment consisting of small trees and shrubs, would be destroyed in the overbank areas by the embankment; however, sodding of the embankment and landscaping, where permitted, would be done following construction. During construction of the embankment, and for a period of time afterwards, the water quality of the creek would be adversely affected due to erosion of the site; however, no long-term effects on the water quality are anticipated.

4.25 Normal groundwater levels in areas upstream of Winnetka Avenue would not be significantly altered during the construction of the flood control structure nor during flood periods and the average annual recharge to deeper aquifers would not change.

4.26 This structure would increase floodwater storage on the Brookview Community Golf Course and commercial and private property in the area of Highway 55 and County Road 18. Increased storage on the golf course would close the course for about two additional days over existing conditions following a 100-year flood event, while storage in other areas could affect future uses. Neither the policies of the Bassett Creek Flood Control Commission nor the provisions of the Golden Valley Flood Plain Ordinance completely restrict development below the current flood zone elevation of 890. The Commission's policy allows filling of the floodplain with compensating flood storage and/or channel improvement so that the flood level would not be increased at any point along the channel. Golden Valley's Flood Plain Ordinance allows filling to the

extent that reasonable anticipated uses would not unduly affect the efficiency of the floodplain or unduly increase flood levels assuming an equal degree of encroachment for a significant reach on either side of the stream. The proposed plan would result in a 100-year floodplain elevation of 889. It is expected that current floodplain regulations would be amended to reflect proposed project conditions and the above-mentioned policies would then apply to the floodplain below elevation 889. Because the necessary flood storage volume (500 acre-feet) can be obtained on existing public properties and because private properties could be developed consistent with the ordinance, it is not expected that property values would change appreciably from existing conditions.

4.27 The existing outlet structure at Medicine Lake would be removed and a new structure and embankment would be constructed about 500 feet downstream of Medicine Lake next to an existing railroad embankment. The new structure would occupy about 0.2 acre of marshland. The existing railroad bridge would have to be replaced. This flood damage reduction structure would have no effect on floods up to a 20-year frequency or approximately the 889-foot elevation. The water depth would be increased on about 0.5 acre of Type 2 wetland, changing it to a Type 3 or Type 4 wetland. The existing marsh vegetation and wildlife habitat would be destroyed at the embankment. The 100-year flood level on Medicine Lake would be decreased by about 0.5 foot.

Plymouth Creek Upstream of Medicine Lake

4.28 No adverse impacts on the existing environment would result since the proposed project calls for no action. The base condition consisting of floodplain regulation and flood insurance along this reach would be maintained.

North Branch of Bassett Creek

4.29 The flood control structure upstream of T.H. 100 on the main stem of Bassett Creek increases the 100-year flood level in Bassett Creek Park on the North Branch approximately 3 feet resulting in an additional 10 acres of inundation area within the 100-year floodplain. Since it is expected that the water level in the park would return to a level of about 1 foot above normal within days following a 100-year flood event, no long-term effects on the wildlife habitat or existing plant succession are anticipated.

4.30 The new culvert crossings at 32nd, Adair, Brunswick and 34th Avenue North would result in adverse effects on the existing environment during the construction of these crossings. The long-term impacts of the construction would consist of the removal of vegetation and the placement of riprap for a distance of approximately 25 feet and 50 feet upstream and downstream, respectively. The riprap would be placed on the channel banks. The water quality of Bassett Creek, downstream of the new crossings, would be adversely affected during construction due to increased erosion potential; however, no long-term water quality effects are anticipated. Aquatic organisms would be destroyed during construction.

The species of organisms that repopulate the area may be different due to the change in substrate. The riprap substrate would produce a wider variety and a greater quantity of aquatic organisms than what previously existed. Road raises are also proposed for 32nd, Adair and Brunswick Avenues. Adverse effects of the road raises consist of noise and air pollution associated with the construction activities. In most cases adverse effects would consist of the visual impact of the raised roadway.

4.31 Between Douglas Drive and Florida Avenue North, a restrictive flood storage control structure would be constructed on the North Branch of Bassett Creek. The construction of this flood control structure would require disruption of approximately 1/6 of an acre of land for the construction of an earth embankment, culvert and overflow weir. This is predominantly a wooded area and the construction would result in the destruction of trees and shrubs. The adverse effects on the existing environment would be compensated in part by beautification measures following the completion of the construction of the embankment.

4.32 Between the flood control structure and 36th Avenue North, approximately 25,000 cubic yards of earth would be excavated, three residences would be evacuated, enlarged culverts would be placed at the Florida and Hampshire Avenue channel crossings, and the Georgia Avenue channel crossing would be removed to provide flood water storage in this area. The excavation of this area would result in an adverse impact on the existing wildlife habitat and the existing water quality along this reach of the creek; however, long-term adverse effects to existing environment would be compensated due to landscaping, restoration and beautification measures which would be carried out following the construction phase. The evacuation of the three residences and the removal of the Georgia Avenue crossing would result in a net gain in the open space available in this area. During the excavation of the flood storage area, an undetermined number of large trees would be removed on about 1 acre. The removal of these trees would have an adverse aesthetic and biological impact on the area. The aesthetic qualities of the area would be severely impacted on. Tree planting and landscaping would be conducted following construction at the flood storage sites.

4.33 Between Hampshire Avenue and Louisiana Avenue, a flood storage area would be excavated along the existing channel through the backyards of residences along this reach. Approximately 3,400 cubic yards of earth and some large willow trees would have to be removed as a result of this excavation. The long-term impacts of this action would be compensated through beautification measures following the completion of construction. Upstream of Louisiana Avenue North along the North Branch of Bassett Creek, there would be no adverse effects on the environment since the proposed project consists of no action.

Sweeney Lake Branch of Bassett Creek

4.34 There would be no adverse effects as a result of the project on the existing environment along the Sweeney Lake Branch since the proposed project recommends no action but would maintain the base condition consisting of floodplain regulation and flood insurance.

Social and Cultural Considerations

4.35 Social and cultural impacts can be anticipated as a result of the proposed action. These social and cultural impacts are discussed in the following paragraphs.

4.36 Floodplain regulations and flood insurance would be the proposed plan for various portions of the watershed. These flood damage reduction methods have both social and biological impacts.

4.37 Strict floodplain regulations do have some adverse effects. Floodplain zoning regulations restrict alterations and extensive repairs to existing non-conforming uses within the regulatory floodway. Normal maintenance and repairs are premitted for all existing floodplain structures. Existing structures in the flood fringe could be extensively repaired or altered, if protected to the 100-year flood elevation. Also, existing structures in the floodplain and future structures in the flood fringe, when protected to the 100-year flood elevation, are eligible for Federal or federally subsidized financing with the purchase of a flood insurance policy.

4.38 Thus the initial effects of an effective floodplain zoning program would generally be adverse to those people owning flood prone property. In addition to the financial hardships, the floodplain regulations would have social and aesthetic effects in those areas where developments were allowed to deteriorate to a point of uselessness before being torn down and the residents relocated. On the other hand, this alternative would primarily affect those individuals that live in the floodplain area and would not create extensive effects on the human or natural environment in some areas removed from the problem area.

4.39 The National Flood Insurance Program was created to curb the continually increasing annual losses from flood damage and was intended to be an alternative to structural programs and a method of reducing direct Federal disaster relief. Although it does not prevent flood damages from occurring in the short-term, flood insurance would assist property owners in recovering from flood damages. In the long term, floodplain regulations and flood insurance reduce non-conforming uses and promote evacuation in some cases.

4.40 The National Flood Insurance Program is separated into two phases; the emergency phase and the regular phase. Under the emergency phase of the program, insurance premiums are heavily subsidized by the Federal government. Coverage for new or existing structures is available up to \$35,000 for single unit residential structures (\$10,000 for contents) and \$100,000 for non-residential structures (\$100,000 for contents).

4.41 Once a detailed engineering study is completed which establishes the severity of the flooding threat within a community, the community is converted to the regular phase of the program. Rates for new structures are no longer subsidized and are referred to as "actuarial rates" and the level of coverage is double that of the emergency program. New structures within the floodplain must be insured at actuarial rates, but owners of existing structures may purchase the first phase of the total coverage at subsidized or actuarial rates, whichever is lower.

4.42 The economic and social impacts for residents of the intermediate regional floodplain would be great under this plan since it would internalize the costs of floodplain development more than any other plan. The public not residing in the floodplain would experience the smallest adverse social and economic impacts with this plan. The impacts for the larger public would be due to the nature of the program which, for example, does not allow Federal disaster relief for insured properties. This would reduce Federal costs to Federal subsidy of insurance payments until the existing structures in the intermediate regional floodplain become obsolete and are replaced, at which time Federal participation would theoretically end. Therefore, this plan could be very acceptable to the non-resident public.

4.43 The adverse biological impacts of floodplain regulation should be minimal. This plan eliminates non-conforming uses and discourages developments in the floodplain. This would tend to favor floodplain biological systems.

Recreation

4.44 The acquisition of approximately 20 acres for flood storage in the area immediately upstream of the conduit entrance provides the opportunities to develop recreational open space along the creek. The area would be developed as an inundation storage area with a permanent wetland pond to provide a natural area for passive recreational activities during non-flood periods. Development of this natural area along with biking and hiking trails would enhance the recreational potential of the area. The residents of the area and various local agencies have expressed a desire to enhance the recreational potential of the Bassett Creek corridor in Minneapolis.

4.45 Increased flood storage on Brookview, Golden Valley and Theodore Wirth Golf Courses would increase the adverse effect of flooding on the use of these courses during flood periods. It is anticipated that as a result of the proposed action, Theodore Wirth and Brookview Community golf courses would be closed to the public up to two additional days following a 100-year flood event. There would be some adverse social impacts associated with the decrease in the amount of time the course is available for use. The proposed 100-year flood level on Theodore Wirth Golf Course is approximately 2 feet above the existing 100-year flood level and results in the addition of approximately 15 acres to the 100-year floodplain. The proposed flood level on Golden Valley Golf Course is approximately 0.5 foot below the existing 100-year flood level and results in a decrease of approximately 5 acres in the 100-year floodplain. The proposed 100-year flood level on Brookview Community Golf Course is approximately 1 foot above the existing 100-year flood level and would result in the addition of approximately 35 acres to the 100-year floodplain.

4.46 Increased flood storage in Bassett Creek Park in Crystal, would result in a 100-year flood level approximately 3 feet above the existing 100-year flood level. This results in approximately 10 acres of inundation area being added to the 100-year floodplain. The proposed flood level would not inundate the proposed picnic shelter and pavilion nor would it affect the existing baseball and softball fields and other active recreational facilities in the park. There would be no excavation in the park although the embankment for the flood control structure on the main stem would be constructed along a portion of the east side of the park. The embankment would probably create an adverse visual impact although tree and shrub plantings would help alleviate this problem.

4.47 The use of either Bassett Creek Park or Brookview Community Park for the temporary storage of floodwaters would possibly involve a change in land use. Portions of these parks were purchased with Land and Water Conservation Fund monies, and therefore a conflict could result if a change in land use occurred. During general design stages further coordination between the Bureau of Outdoor Recreation and the Corps of Engineers will be carried out to resolve this potential conflict.

4.48 The proposed action would result in reduced flood levels on two lakes within the watershed. The proposed 100-year flood level on Wirth Lake would be approximately 1.5 feet below the existing 100-year flood level. The reduced flood level on Wirth Lake would result in a reduction of the adverse effects of flooding on the swimming beach. The proposed 100-year flood level on Medicine Lake would be approximately 0.5 foot below the existing 100-year flood level. The reduced flood level on Medicine Lake would provide a minor reduction in the adverse effects of flooding on swimming beaches and proposed boat launching facilities on the lake.

4.49 The proposed flood storage area between Douglas Drive and Hampshire Avenue along the North Branch of Bassett Creek would add approximately 2 acres of open space along the creek. Landscaping and restoration following the excavation of the storage site would reduce the aesthetic impacts of the excavation work. The excavation of the flood storage

There would have adverse aesthetic impacts due to the removal of some large trees on about 1 acre of land. The proposed 100-year flood level in the Markwood Drive area would be approximately 4 feet below the existing 100-year flood level and would remove a net total of approximately 10 acres of residential properties and streets from the 100-year floodplain.

1.50 The flood control structures would remove existing vegetation and destroy wildlife habitat. Shallow rooted shrubs and grasses would be replaced in some areas to reduce the long-term effects of vegetation removal on wildlife and aesthetics. The project is not expected to impact on any threatened or endangered species of wildlife or vegetation.

Public Health and Safety

1.51 The health and safety of residents in the watershed is directly affected by flooding. The increased flood protection resulting from the proposed action would reduce the threat to life resulting from potential electrical shocks and injurious falls to flood residents due to restricted movement along flooded thoroughfares. The proposed action would also reduce future threats to public health and safety resulting from obstruction of local traffic, vermin from flooded areas, damage to wastewater collection facilities, damage to water supply systems and increased disease production during a major flood. The threat of flood impeded emergency medical, fire and law enforcement services would be reduced by the proposed action.

Human Aspects

1.52 The evacuation of three residences and the relocation of the residents would cause significant disruption of their life-styles. They would experience the considerable personal inconvenience of moving and adjusting to a new neighborhood. This would be considered objectionable by the people affected. One of the three homes is currently owned by the City of Bristol as a result of a tax forfeiture and thus would not require the relocation of people due to the evacuation of this structure. Evacuation of two of the homes allows the development of a flood storage area which would result in a 4-foot reduction in the 100-year flood level in the Markwood Drive area which would remove 26 homes from the 100-year floodplain. One of these homes is subject to substantial flood damage as a result of existing flood levels. The home which would be evacuated in the Bassett Creek Park area is subject to flooding with existing flood levels and would have to be flood proofed or evacuated to prevent flood damages due to existing flood levels.

1.53 Flood proofing of 19 homes in the watershed would cause short-term disruption of the life-styles and personal inconvenience to the affected residents during the flood proofing modifications. However, the long-term reduction of the flood threat and related economic losses sustained by the homeowners would at least partially offset the short-term adverse social effects of flood proofing. Most of these homes would be subject to basement flooding. These residents may obtain flood insurance in lieu of flood proofing. Flood proofing measures could include filling around or closing off walk-out basements.

4.54 During the construction of the cut and fill portions of the proposed conduit along 2nd Avenue North and Glenwood Avenue, local traffic patterns would be disrupted. While a portion of Glenwood Avenue would be relocated slightly as part of the construction of Interstate 94, the construction of the proposed conduit would increase traffic disruption. Suitable alternate traffic routes are available, although increased congestion can be expected on the alternate routes as a result of the conduit construction. Access to commercial and industrial properties along these streets may be temporarily disrupted during construction.

4.55 Throughout the watershed, the construction of the improved culvert crossings of the creek would cause temporary local disruption of traffic patterns. Alternate traffic routes are available at each location where an improved culvert crossing is proposed. Increased traffic can be expected at these areas during construction. The removal of the Minnaqua Avenue crossing of the main stem and the Georgia Avenue crossing of the North Branch would require that local residents find alternate routes.

4.56 Beneficial social impacts of the proposed action would include flood protection for about 220 families and 18 businesses thereby reducing economic losses, community disruption and potential threats to public health and safety incurred during flood periods. Adverse social impacts would include evacuation of three homes and relocation of two families, flood proofing of 19 homes and disruption of the aesthetic qualities in localized areas due to construction of structural flood control features.

Open Space

4.57 It is impossible to completely separate the beneficial aspects attributable to open space from recreational, human, or aesthetic considerations because they are so interrelated. Researchers have shown the benefits of open space in an urban environment (James, et al, 1975: James et al. 1974; Lull and Reinhart 1972.)¹ Some of these values are recreational, educational, ecological, and social well-being, including benefits to human mental health.

(1) James, L.D., A.C. Benke and H.L. Ragsdale, 1975. Integration of Economic, Ecologic, Social, and Well-Being Factors in Planning Flood Control Measures for Urban Streams. Georgia Inst. Tech. ERC-0375.

James, L.D., D.R. Brogan, E.A. Laurent, and H.E. Baltimore. 1974. Community Well-Being as a Factor in Urban Land Use Planning. Georgia Inst. Tech. ERC-0174.

Lull, H.W. and K.G. Reinhart. 1972. Forests and Floods in the Eastern United States. Northeastern For. Exp. Sta. RP-NE-226.

4.55 Open space has an effect on hydrologic processes by reducing flood peaks and runoff as compared to urbanized areas. Other attributes of open space are the preservation of the natural environment in an urban setting; and the associated educational, recreational, and social well-being benefits. The importance of exposure to diverse natural phenomena to the mental well-being of the human population is little understood, but it is certainly great enough for urban planners to promote general access to natural areas for the entire urban population.

4.56 Open space would be created at the entrance of the conduit. Some open space areas, such as golf courses and parks, would be used as temporary floodwater storage areas. The floodwater storage areas would not entirely destroy any open-space values that existed previously and in some cases would enhance open-space values.

Aesthetic Aspects

4.60 All structural features of the proposed project would be subjected to beautification measures to reduce the adverse effects on the aesthetic quality of the stream environment. These proposed beautification measures would consist of rustification of all visible concrete surfaces, sodding of all earth embankments to enhance their visual appearance, and at necessary locations, construction of visual barriers consisting of trees and shrubs and/or wooden fences, to reduce the adverse aesthetic impacts of construction activities. Trees and shrubs would be planted in access and work areas.

Economic Aspects

4.61 The proposed project has a total estimated first cost of \$10.14 million, of which about \$7.33 million represents Federal costs and about \$2.81 million represents local costs. The proposed project would result in \$674,000 reduction in the average annual flood damages at an average annual cost of \$633,000. Average annual flood damage reduction benefits of approximately \$304,000 would accrue to residential property owners, \$331,000 would accrue to commercial and industrial property owners or proprietors and \$39,000 would accrue to the public. Average annual recreation and advance replacement benefits are \$28,100 and \$162,100 respectively. This combined with the flood control benefits of \$657,100 and redevelopment benefits of \$85,400 gives a total of \$949,700 average annual benefits. Average annual maintenance costs are \$10,000. Residual average annual damages of \$93,800 would remain. These damages would result from storms of greater frequency than the 100-year storm, and would include damages incurred by the temporary storage of flood water on Theodore Wirth, Golden Valley Country Club, and Brookview Community Golf Courses and the residual transportation damages on the Sweeney Lake Branch of Bassett Creek. The project has a resulting benefit-cost ratio of 1.5 to 1.

Archaeological/Historical Impacts

4.62 The project is in an area that is approximately 60 percent urbanized. Land use along Bassett Creek varies in type from landscaped parks and golf courses built on filled swamp areas to residential areas, and industrial centers with extensive asphalt or concrete surfaces. The western reaches of the creek flow through swampy lowlands. In the areas identified in the reconnaissance report as having high archaeological potential, intensive subsurface testing will be conducted. In those areas which cannot be tested prior to construction, an archaeologist will be present during construction. There are no known sites in the project area that will be adversely affected by the project.

5.00 ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

5.01 If the proposed flood control project is authorized, some adverse environmental effects could not be avoided.

5.02 About 26 acres of land would be modified by proposed structural flood control features. A total of approximately 23 acres of land would be excavated to provide flood storage areas of the required volume at the inlet of the proposed new conduit and along the North Branch between Douglas Drive and Louisiana Avenue North. These sites would provide inundation type flood storage during flood periods and provide urban open space for passive recreational activities during nonflood periods. As such, suitable vegetative cover would be restored and appropriate landscaping measures would take place following construction. The excavation of 26,000 cubic yards between Douglas Drive and Louisiana Avenue North would result in the removal of the Georgia Avenue crossing and would require the removal of trees on about 1 acre of land. This would result in adverse impacts on wildlife habitat and the aesthetics of the area. The removal of the Georgia Avenue crossing would result in a gain in open space. A total of less than 3 acres of land would be covered by flood storage control structures throughout the watershed. The existing vegetative cover would be destroyed by construction at these sites, however, some vegetative cover would be restored following construction. Although less than 3 acres would be used for embankments approximately 15 acres would be disturbed due to access and work space requirements.

5.03 The construction of the flood storage site at the inlet to the proposed conduit would result in a severe adverse effect on the existing aquatic and terrestrial environment between the inlet of the existing conduit and Irving Avenue. Following the construction at the site, the aquatic environment would reestablish itself although the ecological system would be one of a wetland pond rather than that of a confined stream channel. The construction of flood storage control structures can be anticipated to cause adverse disruption of both the aquatic and terrestrial environment in these local areas.

5.04 The lowering of water levels of the infrequent floods on Medicine Lake would have a minor adverse effect on the northern pike fishery. The proposed outlet structure at the lake would destroy about 0.2 acre of wetland and would change about 0.5 acre of Type 2 wetland to either Type 3 or 4 wetland.

5.05 The clearing and snagging would reduce the fish populations in the immediate construction area. It would also destroy microorganisms in the project area and would temporarily increase turbidity problems. Some microorganisms would reestablish after construction, although the density and species may be different. Channel widening would have similar effects.

5.06 The construction activities in various parts of the watershed would result in short- and long-term impacts. An increase in turbidity and the destruction of some aquatic organisms due to construction could be considered short-term impacts. Microorganisms from upstream and downstream of the disturbed area would repopulate the area. The rate of repopulation could depend upon the time of year and the size of the area disturbed. The loss of the substrate (logs and other debris) would effect the time necessary for reestablishment. The placing of riprap at some locations would provide a substrate for some species of aquatic organisms. Long-term impacts would occur to clams and some species of fish where it would require years before these animals could recolonize the disturbed area.

5.07 The evacuation of residences would disrupt the life-styles and result in personal inconvenience to the residents of these homes. The life-styles of the residents of homes to be flood proofed would be temporarily disrupted during the construction of these modifications.

5.08 Temporary disruption of life-styles and daily routines would be caused by the construction of structural flood control features. These adverse social effects would be caused by construction equipment operation, thoroughfare detours and impairment of aesthetics. Some permanent loss of aesthetics would result from the adverse visual impact of the embankments.

5.09 Riprap would be placed at various locations, for example culvert replacements. The construction would destroy the existing aquatic habitat and bank vegetation. Some aquatic organisms would reestablish themselves on the riprap substrate. Road raises would cause temporary noise and air pollution during construction activities. Depending on the location and how high the road surface is elevated the raised road could be aesthetically displeasing or create somewhat more difficult access to properties.

5.10 Some utilities, primarily sanitary sewers and water distribution mains, would necessarily be relocated by the construction of the proposed project. Disturbances to natural communities at the present location and at the relocation sites could be expected when these utilities are moved.

6.00 ALTERNATIVES TO THE PROPOSED ACTION

6.01 The solutions considered in this study to meet water and related land resource problems and needs in the Bassett Creek Watershed, particularly for reduction of flood damages, were separated into three principal categories: nonstructural measures including no action or maintenance of the base conditions of the watershed; structural measures; and possible solutions involving combinations of nonstructural and structural measures. Structural flood control measures were considered to supplement or compliment nonstructural measures. Coordination was maintained with Federal, State and local agencies having related programs or interests in the area of the identification and evaluation of potential solutions.

6.02 Various non-structural and structural flood control measures could reduce the potential for flood damage in the Bassett Creek Watershed. Nonstructural measures include: no action, consisting of a system of flood forecasting and flood warning, floodplain regulations and the flood insurance program; permanent floodplain evacuation; and flood proofing and partial evacuation. Structural flood control measures for the watershed include: combinations of flood storage, channel modification and diversions upstream of Irving Avenue. In addition, structural measures for the outlet reach from the Mississippi River to Irving Avenue include: repair of the existing conduit; a new conduit; and an open channel.

6.03 The basic objective of the plan formulation process is to develop a plan which will provide the best use or combination of uses of water and related land resources to meet all foreseeable short- and long-term needs in the watershed. In pursuit of this general objective, components of two national planning objectives (National Economic Development and Environmental Quality) for the Bassett Creek Watershed must be identified. In the study of flood and related problems in the Bassett Creek Watershed, the following specific planning objectives have been identified:

- a. Any plan must preserve to the maximum extent possible the quality of the stream environment throughout the watershed and must be coordinated with local beautification planning studies.
- b. The plan must provide flood damage reduction or compensation for losses to a degree acceptable to the people being protected. Protection from a 1-percent chance flood is considered the minimum degree of protection acceptable.
- c. The plan must be socially acceptable to the people being protected and must be acceptable to the local sponsor.
- d. The plan must enhance the economic welfare of the local people and add to their security and well-being.

6.04 The various combinations of alternatives presented on the following pages are derived from the following proposals:

Alternatives For Outlet
Reach From Mississippi
River to Irving Avenue

- A. repair existing conduit
- B. new conduit in non-highway right-of-way
- C. new conduit in Third avenue distributor right-of-way and deep tunnel
- D. new conduit interstate 94 right-of-way and deep tunnel
- E. open space-open channel corridor to Mississippi River

Alternatives For The Upper
Portion of The Bassett
Creek Watershed

Non-Structural

- 1. no action--maintain base condition
- 2. permanent floodplain evacuation as a supplement to base condition
- 3. flood proofing - partial evacuation as a supplement to base condition

Structural

- 4. flood storage and channel modification

- 5. flood storage and diversion

Combination

- 6. flood storage and flood proofing

6.05 Generally, the reduction of potential flood damages along Bassett Creek using structural measures requires that a combination of specific structural features can be used within a particular reach of the creek. Therefore, the structural measures are designated according to their principal structural feature for ease of reference. Nonstructural and structural measures considered and their related technical, economic, social and environmental effects are discussed in the following paragraphs. Economic data for all alternatives are based on a 100-year period of amortization and a 6 1/2 percent interest rate.

Non-Structural Alternatives

(Alternate 1) - No Action--Maintain Base Condition

6.06 Maintaining the base condition would consist of taking no additional nonstructural or structural action to alleviate flood problems. The base condition for the Bassett Creek Watershed consists of a flood forecasting-flood warning system. Floodplain regulations are required under Federal and State law, and flood insurance is available under Federal programs. While all municipalities within the watershed have not as yet adopted floodplain ordinances as required by the 1969 Minnesota Floodplain Act, nor applied for flood insurance, it is anticipated that all of the municipalities within the watershed will do so in the near future.

6.07 In the Bassett Creek Watershed, flood forecasting/flood warning consists of reasonably predicting the time and magnitude of a flood permitting the evacuation of flood-prone areas or the erection of emergency flood protection works. While major regional spring floods caused by snowmelt can be predicted with some reliability, the more localized summer floods due to intense rainstorms cannot. A flood forecasting/flood warning system is presently available for the Upper Mississippi River Basin through the National Weather Service. In addition, the National Weather Service provides a Flash Flood Watch and Warning service through its Minneapolis Office. However, forecasting and warning systems alone do not provide sufficient flood protection in the Bassett Creek Watershed because of the short duration of summer rainfall events which produce critical flood levels. As a result of high intensity summer rainfall in the Bassett Creek Watershed, flood peaks can be expected to occur in portions of the watershed as early as one hour after rainfall begins, and even several hours warning would not provide the time required for the implementation of emergency protection measures.

6.08 The floodplain zoning ordinances for the municipalities in the Bassett Creek Watershed are in various phases of adoption. All communities in the watershed, except Crystal and Plymouth, have adopted floodplain zoning ordinances approved by the Minnesota Department of Natural Resources. The floodplain zoning ordinances for the cities of Plymouth and Crystal have been approved by the Minnesota Department of Natural Resources and are in the process of being adopted.

6.09 Federally subsidized flood insurance is available in the cities of Crystal, Golden Valley, Minneapolis, Minnetonka, New Hope, Plymouth, Robbinsdale and St. Louis Park. Flood insurance is currently not available in the city of Medicine Lake, and the city is not presently required by Federal or State laws to enroll in the program. Flood insurance by itself does not prevent or reduce flood damages, but assists only by reimbursing participating property owners for losses sustained from flooding to existing development. Flood insurance does, however, afford the individual affected some economic protection from flood loss by spreading the total economic loss from flooding over a larger portion of the population.

6.10 Maintaining the base condition or recommending no action be taken to alleviate flood problems would not burden the local interests and the Federal government with the additional financial costs associated with other alternatives. However, average annual flood damages of approximately \$767,900 would remain as a severe social and economic burden. In addition, the large commercial and industrial area in Minneapolis, which is located in proximity of the entrance to the existing 1.5 mile conduit, would continue to be subject to possible flooding. In the event of a failure of any section of the existing conduit during a large flood or the accumulation of debris, the discharge capacity of the conduit would be reduced. If debris accumulation or failure of any section of the existing conduit resulted in a 50 percent reduction in the discharge capacity during a 100-year flood event, the flood level would be increased by approximately 6 feet, and more than

250 acres of developed area would be inundated. In addition to public properties and utilities, more than 450 residential dwellings and more than 80 industries would be flooded. The resulting flood damages would be expected to be in excess of \$8 million.

(Alternate 2) - Permanent Flood Plain Evacuation As A Supplement To The Base Condition

6.11 Permanent evacuation of all damageable flood prone structures from the developed floodplain areas in the Bassett Creek watershed would involve acquisition of lands by purchase, removal and relocation of improvements, evacuation and resettlement of the population and management, and permanent conversion of the lands to uses less susceptible to flood damage. Approximately 222 homes and 18 businesses are currently located within the 100-year floodplain in the Bassett Creek Watershed. All of these homes and about 950 persons living in them would have to be relocated. Most of the industries and businesses in the floodplain area cannot be practically or economically moved because of their large size. Estimated tangible first costs for evacuating existing flood prone structures would be approximately \$47,856,000 with an average annual benefit of \$647,100. The benefit-cost ratio of this plan is 0.23 to 1, making the plan economically unfeasible.

(Alternate 3) - Flood Proofing - Partial Evacuation As A Supplement To The Base Condition

6.12 Flood proofing is a combination of structural changes and adjustments to properties subject to flooding primarily for reduction or elimination of flood damages. Although it is most simply and economically applied to new construction, flood proofing is also applicable to some existing facilities. Individual dwelling units could be flood proofed by installing drain fields, permanently closing low openings, installing check valves and filling around former walk-out basements. Care would have to be taken to assure that residences and businesses to be flood proofed would not become isolated during major floods. This alternative would provide for the flood proofing of all suitable structures within the 100-year floodplain and evacuating all others. The depth of flooding was used to determine whether a structure could be flood proofed or would have to be evacuated. All buildings which have less than 2 feet of first floor flooding from the 100-year flood would be flood proofed if access to them could be provided. All other flood prone structures would be evacuated. Using these criteria, 222 homes and 18 businesses would be either flood proofed or evacuated. The estimated first cost for flood proofing and partial evacuation would exceed \$26,346,000. The benefit-cost ratio of this plan is 0.41 to 1, making the plan economically unfeasible.

Structural Alternatives

6.13 Structural alternatives applicable to flood damage reduction in the Bassett Creek Watershed involve combinations of three principal alternative flood control features because of the urban nature of the watershed and development patterns along the creek. These three main categories are channel modification, flood storage and diversion. In those areas where there is little or no existing development in the floodplain, maintaining the base condition is the most cost effective method of providing protection against future flood damage. These areas would include Plymouth Creek upstream of Medicine Lake, the North Branch of Bassett Creek upstream of Louisiana Avenue North and the Sweeney Lake Branch of Bassett Creek.

6.14 Combinations of the three main categories of structural flood control measures are applicable to the Bassett Creek Watershed; however, in the reach from the Mississippi River to Irving Avenue, other structural alternatives were investigated regarding the outlet for Bassett Creek. The outlet alternatives fall into three basic categories: repair of the existing conduit; a new conduit; and an open channel. Several routes for the new outlet conduit for Bassett Creek were reviewed, some of which would cooperatively utilize drainage facilities with those proposed by the Minnesota Highway Department to provide drainage for the proposed Interstate 94 and Third Avenue highway distributor. In accordance with Minnesota Highway Department policy, the cost of these combined drainage facilities would be shared with the Highway Department based on peak flow contributions. To some degree, the selection and coordination of one of these alternative routes depends on the alternative selected by the Minnesota Highway Department to provide drainage from the proposed Interstate 94 and Third Avenue highway distributor and their proposed construction schedules. The Minnesota Highway Department has tentatively indicated that it favors the use of a deep tunnel to carry the drainage to the Mississippi River below the St. Anthony Falls Lock and Dam. At the present time, the Third Avenue highway distributor is scheduled for construction in the spring of 1977, while the construction schedule for Interstate 94 has been set for the spring or summer of 1977.

6.15 Another alternative for providing a new conduit in the outlet reach of Bassett Creek would be to construct a conduit entirely at the expense of the flood control project. This alternative would not utilize combined drainage facilities and, therefore, the entire burden of the construction cost would be placed on the flood control project.

6.16 Several open channel alternatives were identified for the reach of Bassett Creek from the Mississippi River to Irving Avenue. The most acceptable open channel alternative would provide a broad open space corridor through which Bassett Creek would flow from approximately the inlet of the existing conduit to the Mississippi River.

6.17 In order to facilitate the discussion of the flood control alternatives for the watershed as a whole, combinations of the three basic flood control measures of flood storage, channel modification, and diversion are discussed for each of the outlet alternatives for Bassett Creek in the reach from the Mississippi River to Irving Avenue. Following that discussion, the outlet alternatives for the reach from the Mississippi River to Irving Avenue are discussed in combination with flood storage and nonstructural Alternative 3.

(Alternate 4-A) - Flood Storage and Channel Modification with Repair of Existing Conduit

6.18 This alternative would generally consist of modifying the channel, thus improving its discharge capacity within limits imposed by development along the creek, and repairing the existing conduit. The channel would be enlarged and straightened to the extent feasible and necessary with a minimum encroachment on private property. Generally, the existing temporary flood water storage provided by existing restrictive channel crossings upstream of the reaches requiring channel modification would be sufficient to lower the discharge to a level which could be conveyed by the modified channels.

6.19 With this alternate, the existing conduit (Mississippi River to Mile 1.52) would be repaired to extend its useful life. The repairs would generally consist of relining the existing tunnel, replacing portions of the existing tunnel roof and walls and slightly increasing the discharge capacity of the tunnel at certain locations.

6.20 In addition, in order to provide 100-year flood protection, an inundation storage area would be required upstream of the existing conduit inlet (Mile 1.52 to Mile 1.85) because adequate discharge capacity to pass the entire flood flow could not be provided. Flood walls would be required along the periphery of the inundation area to protect the surrounding development. Interior drainage facilities would be included to prevent flooding from occurring behind the flood walls. The proposed 100-year flood level in this inundation storage area would be approximately 1 foot higher than the existing 100-year flood level at the conduit inlet.

6.21 Between the conduit inlet and Penn Avenue, this alternative would generally consist of some clearing and snagging to improve the hydraulic efficiency of the channel. The old Penn Avenue box culvert (Mile 2.35), which is no longer used for vehicular traffic, would be removed to improve the hydraulic efficiency of the channel in this location. Immediately downstream from Glenwood Avenue (Mile 2.61 to Mile 2.81), flood walls would be constructed on the left bank of the channel to protect the businesses located there and the channel in this location would be enlarged, which would require construction of retaining walls on the right bank of the channel. The existing low head rock dam would be replaced.

6.22 Between Glenwood avenue and Bassett Creek Drive (Mile 2.81 to Mile 5.14), the existing flood water storage on Theodore Wirth Park and Rice

Lake would be utilized and the existing flood levels would not be increased. Portions of Dresden Lane (Mile 4.91) and Bassett Creek Drive (Mile 5.14) would be raised to prevent inundation during flood periods.

6.23 From Bassett Creek Drive to Highway 100 (Mile 5.14 to Mile 6.55), the channel would be widened and straightened and each of the channel crossings would be enlarged. The channel crossing at Bassett Creek Drive just upstream of Rice Lake would be replaced by a larger culvert, the channel crossings at Noble Avenue (Mile 5.53) and Regent Avenue (Mile 5.83) would be replaced by bridges and the Minnaqua Avenue bridge (Mile 5.94) would be removed.

6.24 Upstream of Highway 100, Bassett Creek Park would be utilized for temporary flood water storage in its existing state and at its existing flood level. A portion of 29th Avenue, immediately downstream of Bassett Creek Park crossing the North Branch of Bassett Creek (Mile 0.04) would be raised slightly to prevent inundation during the regional flood. Along the main stem, the channel of the creek would be enlarged and modified, and several crossings between Westbrook Road and Hampshire Avenue (Mile 7.01 to Mile 8.22) would be hydraulically improved. Temporary flood water storage would be provided on Brookview Community Golf Course (Mile 9.15 to Mile 10.79) to reduce downstream discharges to the capacity of the modified channel. The proposed 100-year flood level on Brookview Community Golf course would be approximately 1 foot above the existing 100-year flood level. In the reach immediately downstream from Medicine Lake (Mile 11.97 to Mile 12.11), the channel would be modified, which along with repair of the outlet structure would improve the hydraulic efficiency of the Medicine Lake outlet and reduce damage to dwellings around Medicine Lake during the regional flood. The proposed 100-year flood level on Medicine Lake would be approximately 0.5 foot below the existing 100-year flood level.

6.25 Along the North Branch of Bassett Creek, the existing channel crossings would be enlarged sufficiently at 32nd Avenue (Mile 0.49), Adair Avenue and Brunswick Avenue (Mile 0.57) to lower the flood level upstream of 32nd Avenue and reduce flood damages to dwellings in the area during the regional flood. Portions of Adair, Brunswick and 32nd Avenues would be raised slightly to prevent inundation during the regional flood. Some temporary flood storage would be retained upstream of 32nd Avenue North. The channel crossing at 34th Avenue North (Mile 0.80) would be replaced by a larger culvert. The existing flood storage on each side of Douglas Drive (Mile 0.99) would be utilized at its existing 100-year flood level, and Douglas Drive would be raised slightly to prevent inundation during the regional flood.

6.26 The channel crossings at Florida (Mile 1.12), Georgia (Mile 1.18) and Hampshire Avenues (Mile 1.29) would be replaced by large culverts. A new storm sewer would collect the local drainage between Hampshire and Louisiana Avenues (Mile 1.52) and route it downstream of Hampshire, thus reducing the flood level in the area between Hampshire and Louisiana Avenues North.

6.27 The first cost of this plan would be \$12,218,000 and the benefit-cost ratio would be 0.89 to 1. With this plan, residual average annual flood damages of \$93,800 would remain. These damages would be due to floods of greater magnitude than the 100-year frequency flood, and for

damage incurred by the flooding of Theodore Wirth Golf Course, the increased flood storage on Brookview Community Golf Course, and the residual transportation damages on the Sweeney Lake Branch.

(Alternate 4-B) - Flood Storage and Channel Modification with a New Conduit in Non-Highway Right-of-Way

6.28 This plan consists of the channel modification alternative (Alternate 4-A) for the upper Bassett Creek Watershed except for the reach from the Mississippi River to Irving Avenue (Mile 1.85). In this reach, a new conduit would be constructed in the right-of-way of city streets, where possible, or through industrial areas. This new conduit would replace the existing conduit which does not provide adequate discharge capacity for 100-year flood protection and which is in need of extensive repair to extend its useful life.

6.29 The proposed new conduit would follow 2nd Avenue North to the right-of-way of the proposed Interstate 94. From the right-of-way of the proposed Interstate 94 to 5th Street North and 5th Avenue North, the proposed route would meander through industrial areas to avoid disruption of existing development. From 5th Street North and 5th Avenue North, the route of the proposed conduit would follow the right-of-way of 5th Avenue North to 2nd Street North, the right-of-way of 2nd Avenue North to 4th Avenue North and follow the right-of-way of 4th Avenue North to the Mississippi River. This alternative for a new conduit requires approximately 50 acre-feet of temporary flood water storage in the area immediately upstream of the proposed conduit inlet (Mile 1.52 to Mile 1.93), which substantially reduces the required discharge capacity of the conduit. This flood storage area would be excavated to provide flood water retention with or without permanent storage. The proposed 100-year flood level in the area would be approximately 4 feet below the existing 100-year flood level. The construction of this storage area significantly reduces the cost of the new conduit between the inlet and the Mississippi River.

6.30 The first cost of this plan would be \$15,425,000, and the benefit-cost ratio would be 0.71 to 1. With this plan, residual average annual flood damages of \$93,800 would remain. These damages would be the result of storms of greater magnitude than the 100-year frequency storm and would include damages incurred by the flooding of the Theodore Wirth Golf Course, the Brookview Community Golf Course and transportation routes along the Sweeney Lake Branch.

(Alternate 4-C) - Flood Storage and Channel Modification with New Conduit in Third Avenue Distributor Right-of-Way and Deep Tunnel

6.31 This plan consists of the channel modification alternative (Alternate 4-A) for the upper Bassett Creek Watershed and the construction of a new conduit for the reach from the Mississippi River to Irving Avenue (Mile 1.85).

6.32 The new conduit would be constructed in the right-of-way of the proposed Third Avenue highway distributor and would connect to a proposed highway drainage tunnel at Third Avenue and Washington Avenue. The proposed highway drainage tunnel would outfall into the Mississippi River below St. Anthony Falls. This new conduit would replace the existing conduit which does not provide adequate discharge capacity for 100-year flood protection and is in need of extensive repair to extend its useful life. This alternative for a new conduit requires a temporary flood storage area of approximately 90 acre-feet immediately upstream of the proposed conduit inlet (Mile 1.42 to Mile 1.93), which substantially reduces the required discharge capacity of the conduit. This flood storage area would be constructed as an inundation area or as a pond, and the proposed 100-year flood level would be approximately 4 feet below the existing 100-year flood level in this area. The construction of this temporary flood storage area significantly reduces the total cost of the new conduit between the inlet and the Mississippi River.

6.33 The first cost of this plan would be \$10,898,000 and the benefit-cost ratio would be 1.00 to 1. The residual average annual damages remaining with this plan would be \$93,800. These damages would be the result of storms of greater magnitude than the 100-year frequency storm and would include damages incurred by the flooding of the Theodore Wirth Golf Course, the temporary storage of flood waters on the Brookview Community Golf Course and the residual transportation damages on the Sweeney Lake Branch.

(Alternate 4-D) - Flood Storage and Channel Modification with a New Conduit - Interstate 94 Right-of-Way and Deep Tunnel

6.34 This plan consists of the flood storage and channel modification alternative (Alternate 4-A) for the Bassett Creek watershed, except for the reach from the Mississippi River to Irving Avenue (Mile 1.85). In this reach, a new conduit would be constructed in the right-of-way of the proposed Interstate 94 and would connect to a proposed highway drainage tunnel at 12th Avenue North and Washington Avenue. The proposed highway drainage tunnel would outfall into the Mississippi River below St. Anthony Falls. This new conduit would replace the existing conduit which does not provide adequate discharge capacity for 100-year flood protection and which is in need of extensive repair to extend its useful life. This alternative for a new conduit requires approximately 90 acre-feet of temporary flood water storage in the area immediately upstream of the proposed conduit inlet (Mile 1.42 to Mile 1.93), which substantially reduces the required discharge capacity of the conduit. This flood storage area would be excavated to provide flood water retention with or without permanent storage, and the proposed 100-year flood level storage in the area would be approximately 4 feet below the existing 100-year flood level in this area. The construction of this temporary flood storage area significantly reduces the total cost of the new conduit between the inlet and the Mississippi River.

6.35 The first cost of this plan would be \$11,935,000, and the benefit-cost ratio would be 0.61 to 1. The residual average annual damages remaining in this plan would be \$90,000. These damages would be the result of storms of greater magnitude than the 100-year frequency storm and would include damages incurred by the flooding of the Theodore Wirth Golf course, the temporary storage of flood waters in Brookview Community Golf course, and residual transportation damages on the Sweeney Lake Franch.

(Alternate 4-B) - Flood Storage and Channel Modification with an Open Space - Open Channel Corridor to the Mississippi River

6.36 This plan would consist of the flood storage and channel modification alternative (Alternate 4-A) for the Bassett Creek watershed except for the reach from the Mississippi River to Irving Avenue (Mile 1.85). In this reach, rather than repair the existing conduit or construct a new conduit, an open channel with substantial open space on either side of the channel would provide this new outlet for Bassett Creek. This proposed open channel alternative would begin near the inlet of the existing conduit and cross Glenwood Avenue between Alrich and Bryant Avenues North. Between Third Avenue and 5th Avenue North, the route would turn easterly so that the open channel would cross 5th Avenue North between Alrich and the proposed frontage road to Interstate 94. The open channel corridor would then proceed to follow the right-of-way of Interstate 94 to approximately Olson Memorial Highway. The proposed open channel corridor would cross Interstate 94 and remain between 5th and 6th Avenues North to the existing outlet of Bassett Creek at the Mississippi River.

6.37 This proposed open channel would replace the existing conduit which does not provide adequate flood storage capacity for 100-year flood protection and which is in need of extensive repair to extend its useful life. The proposed alternative provides approximately 20 acre-feet of temporary flood storage in the area immediately upstream from the inlet of the new channel. This flood storage area would be excavated to provide the required volume and could be constructed with or without a permanent wall. The 100-year flood level in this area would be 4 feet above the existing 10-year flood level. The construction of the flood storage area could reduce the peak discharge capacity required in the proposed open channel.

6.38 The city of Minneapolis has initiated a study to review possible redevelopment alternatives in this portion of north Minneapolis. Although the study has not been completed, it is anticipated that if the open space and open channel corridor were included as a part of the redevelopment alternatives for this area, substantial recreational and land enhancement benefits could be realized by construction of this plan. However, the magnitude of the recreational benefits and land enhancement benefits cannot be evaluated until more information regarding the proposed redevelopment of the area including changes in land use and population densities are known and, therefore, these potential benefits are not reflected in the benefit to cost ratio.

6.39 The first cost of this plan would be \$62,145,000, and the benefit-cost ratio would be 0.18 to 1 with only flood control benefits assuming no increased recreational benefits or land enhancement benefits due to future redevelopment of the area. With this plan, residual average annual flood damages of \$93,800 would remain. These damages would be the result of storms of greater magnitude than the 100-year storm and would include damages incurred by flood water inundation of Theodore Wirth Golf Course, the temporary storage of flood waters in the Brookview Community Golf Course and the residual transportation damages on the Sweeney Lake Branch.

(Alternate 5-A) - Flood Storage and Diversion with Repair of Existing Conduit

6.40 This plan consists of a flood storage and diversion alternative for the upper Bassett Creek watershed and repair to the existing conduit (Alternate 4-A) for the reach from the Mississippi River to Irving Avenue (Mile 1.85). This plan would utilize potential flood water storage areas in the watershed or diversion in order to lower discharges in the channel and minimize the need for channel modifications.

6.41 The major temporary flood water storage areas along the main stem would include: Theodore Wirth Golf Course, Rice Lake, Bassett Creek Park, the Golden Valley Golf Course and Brookview Community Golf Course. A control structure would be installed upstream of Highway 55 (Mile 3.15) which would increase the 100-year flood level on Theodore Wirth Golf Course to approximately 2 feet above the existing 100-year flood level. This proposed restriction would not change the normal level of the creek through the golf course. The existing restriction at Dresden Lane (Mile 4.91) would be retained to provide temporary flood water storage in the Rice Lake area at approximately its existing 100-year flood level. The proposed 100-year flood level on Bassett Creek Park would be approximately 3 feet above the existing 100-year flood level and would require a new outlet structure immediately upstream of Highway 100 (Mile 6.46). This outlet structure would consist of a low level conduit to pass normal flow and a weir to pass the flood flow discharges. An embankment would be constructed in the channel on the property of Golden Valley Golf Club (Mile 8.32) which would provide approximately 27 acre-feet of temporary flood water storage. The proposed 100-year flood level would be about 0.5 feet lower than the existing 100-year flood level in this area. The proposed 100-year flood level on the Brookview Community Golf Course would be approximately 1 foot higher than the existing 100-year flood level due to the new channel restriction just upstream of Winnetka Avenue (Mile 9.15). The proposed restriction would consist of a low level conduit to pass normal flow and a weir to pass the flood flow discharges.

6.42 In the reach of the mainstem immediately downstream of the Medicine Lake outlet (Mile 11.97 to 12.11), a short reach of the channel would require modification, which along with repair of the Medicine Lake outlet, would improve the hydraulic efficiency of the outlet and reduce flood damages around Medicine Lake. The proposed 100-year flood level on Medicine Lake would be approximately 0.5 foot below the existing 100-year flood level.

6.43 On the main stem, this plan would provide for the diversion of flood flows from Theodore Wirth Park just upstream of Glenwood Avenue (Mile 2.81) to approximately Penn Avenue (Mile 2.35) to protect the industries located in the area, and to minimize the need for channel modifications in this area. The old Penn Avenue box culvert, which is no longer used for vehicular traffic, would be removed to improve the hydraulic efficiency of the channel at this location. A diversion from Scott Avenue and Culver Road (Mile 6.34) to Rice Lake would intercept a large tributary area to the north of the creek and divert the flood flows to Rice Lake. This diversion would protect the homes between Noble Avenue (Mile 5.53) and Highway 100 (Mile 6.44) and eliminate the channel modifications between Bassett Creek Drive (Mile 5.14) and Highway 100. On the North Branch, a diversion from 36th Avenue North and Jersey Avenue (Mile 1.40) to a flood water storage site at 32nd Avenue and Florida Avenue would be provided. This diversion would provide protection for the homes between Hampshire Avenue and Louisiana Avenue (Mile 1.20 to Mile 1.52) and minimize the required channel modifications in this reach.

6.44 The first cost of this plan would be \$14,187,000, and the benefit-cost ratio would be 0.76 to 1. The residual average annual damages remaining with this plan would be \$97,600. These damages would be the result of storms of greater magnitude than the 100-year frequency flood and would include damages incurred by increased flood storage on Theodore Wirth Golf Course, Golden Valley Golf Course and Brookview Community Golf Course and residual transportation damages on the Sweeny Lake Branch.

(Alternate 5-B) - Flood Storage and Diversion with a New Conduit in Non-Highway Right-of-Way

6.45 This plan consists of the flood storage and diversion alternative (Alternate 5-A) for the upper Bassett Creek Watershed and a new conduit (Alternate 4-B) for the reach from the Mississippi River to Irving Avenue (Mile 1.85).

6.46 The first cost of this plan would be \$17,394,000 and the benefit-cost ratio would be 0.63 to 1. With this plan, residual average annual flood damages of \$97,600 would remain. These damages would be the result of storms of greater magnitude than the 100-year frequency storm and would include damages incurred by the temporary storage of flood water on Theodore Wirth Golf Course, Golden Valley Golf Course and Brookview Community Golf Course and the residual transportation damages on the Sweeney Lake Branch.

(Alternate 5-C) - Flood Storage and Diversion with New Conduit in Third Avenue Distributor Right-of-Way and Deep Tunnel

6.47 This plan consists of the flood storage and diversion alternative (Alternate 5-A) for the upper Bassett Creek Watershed and a new conduit (Alternate 4-C) for the reach from the Mississippi River to Irving Avenue.

6.48 The first cost of this plan would be \$12,868,000, and the benefit-cost ratio would be 0.84 to 1. The residual average annual damages remaining with this plan would be \$97,600. These damages would be the result of storms of greater magnitude than the 100-year frequency storm and would include damages incurred by temporary flood storage on Theodore Wirth Golf Course, Golden Valley Golf Course and on Brookview Community Golf Course and the residual transportation damages on the Sweeney Lake Branch.

(Alternate 5-D) - Flood Storage and Diversion with a New Conduit - Interstate 94 Right-of-Way and Deep Tunnel

6.49 This plan consists of the flood storage and diversion alternative (Alternate 5-A) for the upper Bassett Creek Watershed and a new conduit (Alternate 4-D) for the reach from the Mississippi River to Irving Avenue (Mile 1.85).

6.50 The first cost of this plan would be \$13,907,000, and the benefit-cost ratio would be 0.78 to 1. The residual average annual damages remaining with this plan would be \$97,600. These damages would be the result of storms of greater magnitude than the 100-year frequency storm and would include damages incurred by temporary storage of flood waters in the Theodore Wirth Golf Course, Golden Valley Golf Course and the Brookview Community Golf Course and the residual transportation damages on the Sweeney Lake Branch.

(Alternate 5-E) - Flood Storage and Diversion with an Open Space - Open Channel Corridor to the Mississippi River

6.51 This plan would consist of the flood storage and diversion alternative (Alternate 5-A) for the upper Bassett Creek Watershed and an open space-open channel corridor (Alternate 4-E) for the reach from the Mississippi River to Irving Avenue (Mile 1.85).

6.52 The first cost of this plan would be \$64,114,000, and the benefit-cost ratio would be 0.17 to 1. With this plan, residual average annual flood damages of \$97,600 would remain. These damages would result from storms of greater magnitude than the 100-year frequency storm and would include damages incurred by the temporary storage of flood waters on the Golden Valley Golf Course and the Brookview Community Golf Course and the residual transportation damages on the Sweeney Lake Branch.

COMBINATION OF NONSTRUCTURAL AND STRUCTURAL ALTERNATIVES

(Alternate 6-A) - Flood Storage and Flood Proofing with Repair of Existing Conduit

6.53 This plan consists of flood storage in combination with flood proofing for the Bassett Creek Watershed and repair of the existing conduit (Alternate 4-A) in the reach from the Mississippi River to Irving Avenue (Mile 1.85). This plan would utilize potential flood water storage areas in the watershed in order to reduce flood discharges in the channel. Residences which cannot be protected by flood storage alone would be flood proofed to minimize the need for channel modifications and diversions.

6.54 The major temporary flood water storage areas along the main stem would include: Theodore Wirth Golf Course, Rice Lake, Bassett Creek Park, the Golden Valley Golf Course and Brookview Community Golf Course. The existing channel crossing at Highway 55 (Mile 3.15) would be modified, which would increase the 100-year flood level on Theodore Wirth Golf Course approximately 2 feet above the existing 100-year flood level. This proposed restriction would not change the normal level of the creek through the golf course. The existing restriction at Dresden Lane (Mile 4.91) would be retained to provide temporary flood water storage in the Rice Lake area at approximately its existing 100-year flood level and would require a new outlet structure immediately upstream of Highway 100 (Mile 6.46). This outlet structure would consist of a low level conduit to pass normal flows and an overflow weir to pass extreme flood flow discharges. A control structure would be installed in the channel on the property of Golden Valley Golf Club (Mile 8.32) to provide temporary flood water storage and the proposed 100-year flood level would be about 0.5 feet lower than the existing 100-year flood level in this area. The proposed 100-year flood level of the Brookview Community Golf Course would be approximately 1 foot higher than the existing 100-year flood level due to a new control structure just upstream of Winnetka Avenue (Mile 9.15). The proposed restriction would consist of a low level conduit to pass normal flow and an overflow weir to pass the flood flow discharges.

6.55 Between the conduit entrance and Penn Avenue (Mile 1.52 to Mile 2.35), this alternative would involve clearing and snagging to improve the hydraulic efficiency. The Old Penn Avenue box culvert, which is no longer used for vehicular traffic, would be removed to improve the hydraulic efficiency of the channel at this location. Immediately downstream of Glenwood Avenue (Mile 2.61 to Mile 2.81) floodwalls and retaining walls would be constructed on either side of the channel to protect the businesses located there and the channel would be enlarged. The height of these walls would be about 1 foot higher than the existing retaining walls in this reach.

6.56 Between Golden Valley Road and Dresden Lane (Mile 4.51 to Mile 4.91), a total of 3 homes would be flood proofed to prevent flood damage at the reduced 100-year flood level. Portions of Dresden Lane (Mile 4.91) and Bassett Creek Drive (Mile 5.14), at the south end of Rice Lake would be raised to prevent inundation during the regional flood. The Noble Avenue Mile 5.53) and Regent Avenue (Mile 5.83) channel crossings would be replaced by larger culverts and the bridge at Minnaqua Avenue (Mile 5.94) would be removed. Between Regent Avenue and Highway 100 (Mile 5.83 to Mile 6.44), 6 homes would be flood proofed to prevent flood damage at the reduced 100-year flood level.

6.57 In this reach of the main stem immediately downstream of the Medicine Lake outlet (Mile 11.97 to Mile 12.11), a short reach of the channel would require modification, which along with repair of the Medicine Lake outlet would improve the hydraulic efficiency of the outlet and reduce flood damages around Medicine Lake. The proposed 100-year flood level on Medicine Lake would be approximately 0.5 foot below the existing 100-year flood level.

6.58 Along the North Branch of Bassett Creek, the existing channel crossing would be enlarged sufficiently at 32nd Avenue (Mile 0.49), Adair Avenue and Brunswick Avenue (Mile 0.57) to lower the flood level upstream of 32nd Avenue and reduce flood damages to dwellings in the area. Portions of Adair, Brunswick and 32nd Avenues would be raised slightly to prevent inundation during flood periods. Some temporary flood storage would be retained upstream of 32nd Avenue North. The channel crossing at 34th Avenue (Mile 0.80) would be replaced by a larger culvert. The existing flood storage area on each side of Douglas Drive (mile 0.99) would be used at its existing level and Douglas Drive would be raised slightly to prevent inundation during flood periods. Midway between Douglas Drive and Florida Avenue (Mile 1.05), a restrictive channel crossing would be constructed consisting of new embankment with an outlet culvert for normal flows and an overflow weir for flood flows. The channel between the proposed embankment and Louisiana Avenue (Mile 1.05 to Mile 1.52) would be modified and enlarged, the channel crossings at Florida Avenue (Mile 1.12) and Hampshire Avenue (Mile 1.29) would be removed, thus reducing the 100-year flood level in the area between Hampshire and Louisiana Avenues. This alternative would require the removal of three residential dwellings and relocation of the affected residents.

6.59 The first cost of this plan would be \$11,031,000, and the benefit-cost ratio would be 0.98 to 1. With this plan, residual average annual flood damages of \$98,600 would remain. These damages are due to floods of greater magnitude than the 100-year frequency flood and include the damages incurred by temporarily storing flood waters on the Theodore Wirth Golf Course, the Golden Valley Golf Course and the Brookview Community Golf Course and the residual transportation damage on the Sweeney Lake Branch.

(Alternate 6-B) - Flood Storage and Flood Proofing with a New Conduit in Non-Highway Right-of-Way

6.60 This plan generally consists of the flood storage and flood proofing alternative (Alternate 6-A) for the upper Bassett Creek Watershed and a new conduit (Alternate 4-B) in the reach from the Mississippi River to Irving Avenue (Mile 1.85).

6.61 The first cost of this plan would be \$13,968,000, and the benefit-cost ratio would be 0.78 to 1. With this plan, average annual flood damages of \$98,600 would remain. These damages would be the result of storms of greater magnitude than the 100-year frequency storm and would include damages incurred by flood water inundation of Theodore Wirth Golf Course, Golden Valley Golf Course and Brookview Community Golf Course and the residual transportation damages on the Sweeney Lake Branch.

(Alternate 6-C) - Flood Storage and Flood Proofing with New Conduit in third Avenue Distributor Right-of-Way and Deep Tunnel

6.62 This plan generally consists of the flood storage and flood proofing (Alternate 6-A) for the upper Bassett Creek Watershed and a new conduit (Alternate 4-C) in the reach of the Mississippi River to Irving Avenue (Mile 1.85). The first cost of this plan would be \$9,439,000, and the benefit-cost ratio would be 1.14. The residual average annual damages remaining with this plan would be \$98,600. These damages would be the result of storms of greater magnitude than the 100-year frequency storm and would include damages incurred by flood water inundation of Theodore Wirth Golf Course, Golden Valley Golf Course and Brookview Community Golf Course and the residual transportation damages on the Sweeney Lake Branch. This is essentially the selected plan. Some recreational, aesthetic and environmental enhancement features have been added to this plan to arrive at the selected plan. The project is described in section 1 and the impacts of the proposed action in section 4.

(Alternate 6-D) - Flood Storage and Flood Proofing with a New Conduit - Interstate 94 Right-of-Way and Deep Tunnel

6.63 This plan generally consists of the flood storage and flood proofing alternative (Alternate 6-A) for the upper Bassett Creek Watershed and a new conduit (Alternate 4-D) for the reach from the Mississippi River to Irving Avenue (Mile 1.85).

6.64 The first cost of this plan would be \$10,751,000, and the benefit-cost ratio would be 1.01 to 1. The residual average annual damages remaining with this plan would be \$98,600. These damages would be the result of storms of greater magnitude than the 100-year frequency storm and would include damages incurred by flood water inundation of Theodore Wirth Golf Course, Golden Valley Golf Course, and the Brookview Community Golf Courses and the residual transportation damages on the Sweeney Lake Branch.

(Alternate 6-E) - Flood Storage and Flood Proofed with an Open Space-Open Channel Corridor to the Mississippi River

6.65 This plan generally consists of the flood proofing and partial evacuation alternative (Alternate 6-A) in the upper Bassett Creek Watershed and an open space-open channel corridor (Alternate 4-E) for the reach from the Mississippi River to Irving Avenue.

6.66 The first cost of this plan would be \$60,958,000, and the benefit-cost ratio would be 0.18 to 1. The residual average annual damages remaining with this plan would be \$98,600. These damages would be the result of storms of greater magnitude than the 100-year frequency storm and would include damages incurred by flood water inundation of Theodore Wirth Golf Course, Golden Valley Golf Course and Brookview Community Golf Course and the residual transportation damages on the Sweeney Lake Branch.

Other Alternatives Considered

6.67 Several additional plans were considered for various reaches of the creek, but were rejected because they did not provide 100-year flood

protection or because they were economically, socially, or environmentally undesirable. Enlargement of the channel throughout the watershed, without reliance on existing flood storage sites was reviewed. This would require the replacement of most of the existing channel crossings and extensive relocation of existing development to construct the enlarged channel. Flood barriers were also considered as a flood control measure, however, they would be aesthetically displeasing in residential areas and would require extensive relocation of existing development to construct interior drainage systems.

6.68 In the reach from the Mississippi River to Theodore Wirth Park, several alternatives were considered including: a deep tunnel from the existing conduit entrance to the river; a diversion to the drainage facilities for Interstate Highway 35W; a diversion to Birch Pond and then to Brownie Lake; and a conduit under Plymouth Avenue from Theodore Wirth Park to the Mississippi River. Several alternative routes for an open channel with varying cross-sections were also reviewed.

6.69 In the reach from Theodore Wirth Park to Medicine Lake, several diversion plans from various points on the creek to Sweeney Lake were considered. Upstream of Medicine Lake, a system of temporary storage ponds was reviewed, however, this alternative is highly unfavorable economically. Along the Sweeney Lake Branch, several relocations of the existing channel were considered and along the North Branch, several alternate methods of diverting flood flows were considered.

6.70 The alternative of increasing the temporary flood storage in Theodore Wirth Park or not increasing the existing flood level in its effect on downstream areas was evaluated extensively. Without increased flood storage in Theodore Wirth Park Golf Course, the cost of alternatives immediately downstream of Glenwood Avenue and between Irving Avenue and the Mississippi River increase by approximately one million dollars.

6.71 The cooperative conduit alternatives with varying amounts of storage volume at the conduit entrance were also reviewed. Without storage at the conduit entrance, the capacity of the cooperative conduit would have to be increased because the tunnel would then have to accommodate flows which would be delayed by the proposed ponding area at the inlet. Alternatives without storage at the conduit entrance would cost approximately \$3 million more than alternative with storage at the conduit entrance. The most economic alternative requires approximately 90 acre-feet of storage volume at the conduit entrance.

6.72 The National Economic Development (NED) plan maximizes net economic benefits while addressing the range of planning objectives. National economic benefits are determined by measuring and analyzing the net value of increase in the output of goods and services derived from the plan. Therefore, using the economic criteria outlined earlier, all alternatives are analyzed based on their respective contributions to providing increased gains on the national economic efficiency. The flood storage and flood proofing - partial evacuation with a new conduit along the Third Avenue distributor and deep tunnel alternative (Alternate 6-C) has the highest net benefits and benefit-cost ratio and this constitutes the national economic development plan.

6.73 The Environmental Quality (EQ) plan addresses the planning objectives while emphasizing contributions to aesthetic, ecological, and cultural values. It is necessary to evaluate the alternatives in the context of enhancing the environmental quality to develop the most acceptable environmental quality plan.

6.74 The environmental quality plan would include features of the flood storage/floodproofing-partial evacuation and open space-open corridor alternative (Alternate 6-E) with some modifications that would further enhance the environmental quality. Because the old Penn Avenue (Mile 2.35) box culvert aesthetically enhances the existing park at Penn Avenue, it would be retained and the area to the north of the culvert would be regraded and landscaped providing an overflow channel during flood periods. Nine additional homes would be flood proofed in the reach from Bassett Creek Drive (Mile 5.14) to Highway 100 (Mile 6.44) instead of clearing and snagging in this reach. This would preserve the integrity of the existing aquatic and upland wildlife habitat in the Briarwood Bird Sanctuary and along the creek. The EQ plan proposes the floodproofing of about six homes around Medicine Lake with replacement of the existing outlet structure. There would be no modifications in the marsh downstream of Medicine Lake in the EQ plan.

6.75 The EQ plan would have no effect on the downstream wetland and would not effect the existing high quality northern pike fishery in Medicine Lake. Under existing conditions average annual damages to homes around the lake is \$2,030 and damages incurred due to a 100-year flood are \$23,400.

6.76 Other environmental quality needs include protection and enhancement of aesthetic values and enhancement of recreational opportunities within the creek corridor. Beautification measures include rustification of concrete structural features, landscaping, planting and seeding and general beautification of areas affected by the construction of structural features. To enhance recreational opportunities approximately 17,000 lineal feet of paved bike path and walkway are included in the lower watershed.

Environmental And Social Impacts Of Alternatives To The Proposed Action

6.77 The overriding objective guiding development of the alternatives was the ability to satisfy the need for flood damage reduction or compensation. The environmental, economic, and social well-being objectives are also taken into consideration for guiding further development of the alternatives where they are consistent with the ability to satisfy the need for flood damage reduction.

6.78 All alternatives offer an acceptable degree of flood damage reduction or compensation for incurred flood damages and would enhance the economic welfare of the citizens of the Bassett Creek Watershed. The no action--maintain the base condition alternative, consisting of floodplain regulation and flood forecasting-flood warning, would lessen future flood damages, and flood insurance would reimburse, through com-

pensation, those suffering flood damage. The existing flood insurance premiums are heavily subsidized by the Federal Government making this insurance economically attractive to floodplain residents. However, in the future as flood insurance rate studies are completed in the municipalities within the watershed, flood insurance premiums for new development will be based on actuarial rates.

6.79 Permanent evacuation of the floodplain would give immediate protection from flood damages and when combined with the base condition, would reduce future flood damages. The natural environment of the floodplain would be enhanced due to permanent evacuation, however, relocations would increase development pressures on the natural environment in other locations. The high economic cost and the social disruption resulting from this plan make this plan impractical and undesirable in the Bassett Creek Watershed.

6.80 The flood proofing and partial evacuation alternative would tend to enhance the local economy by reducing future flood damages in flood prone areas within the watershed. The cost to the local sponsor may not be offset by flood damage reduction with this plan due to the long-term effects of reduced property tax base. Within the large metropolitan area, the primary and secondary local employment benefits resulting from evacuation, reconstruction and flood proofing measures would be slight although some regional benefits would result. The flood proofing and partial evacuation plan would provide a high degree of flood reduction; however, some impacts of flooding would remain, such as disruption of transportation and potential dangers to health and safety. While this alternative satisfies the specific objective of flood damage reduction, the social disruption due to the partial evacuation and the disruption to transportation make this plan undesirable for the Bassett Creek Watershed.

6.81 However, in certain reaches of Bassett Creek and its tributaries where existing development is not isolated during major floods and is not subject to excessive inundation, flood proofing and partial evacuation as a supplement to the base condition or in combination with structural alternatives provide a viable flood damage reduction alternative.

6.82 The effects of the structural alternatives on the quality and aesthetics of Bassett Creek varies considerably. The flood storage and channel modification alternatives would have severe adverse effects on the quality and aesthetics of Bassett Creek. Channel modification would necessitate the removal of a large number of mature trees and the understory vegetation growing along those reaches of Bassett Creek. While restoration measures such as landscaping and replanting would minimize the long-term adverse aesthetic effects due to channel modification, the short-term aesthetic effects would have a significant adverse effect on the residential properties abutting the creek through most of the reaches requiring channel modification. Channel modification would have significant short-term effects on the biological systems in the creek.

bed and overbank areas due to the construction of the channel modification. The biological associations in these areas would be significantly disturbed or destroyed as a result of the construction of the channel modifications. In the long-term, the biological systems which would be reestablished along the creek would differ significantly from those which currently exist in those areas. The aesthetics of the creek corridor would be significantly changed in the long-term due to the removal of the natural meanders, oxbows and backwater areas which currently exist along the creek. During the construction of the channel modification, the erosion of exposed soils and the subsequent sedimentation would have a severe adverse effect on the water quality and aesthetic value of the creek in the reaches downstream of the channel modifications.

6.83 The residents of the watershed have indicated that extensive channel modifications are unacceptable due to the environmental and aesthetic effects. In addition, there are several alternative plans more economically feasible than the flood storage and channel modification alternatives.

6.84 The flood storage and diversion alternative would significantly reduce the adverse effects on the quality and aesthetics of Bassett Creek when compared to channel modification. The short-term impacts of project construction are less severe for the flood storage and diversion alternatives than for the flood storage and the channel modification alternatives since it would require the disruption of the stream channel and overbank areas only at the locations of the flood storage control structures where channel crossings are being replaced. The flood control structures would consist of earth embankments similar to those at many of the street crossings of the channel. These earth embankments would be sodded and grass seeded to provide more aesthetically pleasing structures.

6.85 The diversion alternatives would have adverse effects on the quality and aesthetics along the route of the various diversions. The Jersey and 32nd Avenue diversion along the North Branch and the Culver Road diversion to Rice Lake would require substantial excavation along those residential streets to install the diversion interceptors. During the construction of those interceptors, the quality and aesthetics of the residential areas along these routes would suffer significant social disruption although wise construction practices could minimize these adverse effects.

6.86 The diversion of the creek at Glenwood Avenue would have significant adverse effects along the route of that diversion. The existing natural vegetation along much of this route would have to be removed for the construction of the diversion. The existing wildlife habitat along this diversion route would be disrupted during construction and during that period in which the area would be returning to its natural state. Although biologically this area is not particularly unique, the biological systems would be subject to considerable disruption of this diversion. Generally, the flood storage and diversion alternative is an environmentally acceptable alternative for flood damage reduction but it is not as economically feasible as the selected plan.

6.87 All of the outlet alternatives offer an acceptable degree of flood damage reduction or compensation for incurred flood damages and enhance the economic or environmental welfare of the citizens of the Bassett Creek Watershed. The repair of the existing conduit and all of the new conduit alternatives are comparable with respect to the environmental and social effects and generally the alternatives would have an insignificant effect on the quality and aesthetics of the existing stream environment. Economically, the new conduit alternative along the Third Avenue distributor constructed in cooperation with the Minnesota Highway Department has the highest net benefit and costs \$5.5 million less than a new conduit in non-highway right-of-way. The preferability of other outlet alternatives, with respect to their economic feasibility are: new conduit along Highway 94 to deep tunnel in cooperation with Minnesota Highway Department; repair of the existing conduit; and new conduit in non-highway right-of-way.

6.88 The open space-open channel corridor alternative, as a replacement for the existing conduit, would significantly enhance the quality and aesthetics of the stream environment in the city of Minneapolis. The open space created would also result in land enhancement and recreational benefits in conjunction with the proposed redevelopment plan in the area. The magnitude of these benefits, however, cannot be quantified until more information regarding possible land use changes and population densities has been identified. The open space-open channel corridor outlet alternative is the most environmentally beneficial and is the most socially acceptable alternative to some of the people of the area.

7.00 RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

7.01 The principal long-term impacts derived from the Bassett Creek Watershed Flood Control Project are flood control, creation of open space, and construction of flood storage embankments. Open space would benefit everyone in the watershed directly or indirectly, while construction of flood storage embankments and flood control would affect a minority of watershed residents.

7.02 Short-term impacts would include temporary social and environmental disruptions during construction. Localized air, noise and water quality degradation along with traffic flow disturbances, and residential and industrial disruptions are temporary adverse impacts. Long-term environmental effects would occur at embankment sites due to the destruction of vegetation and the associated visual impact of the embankments.

7.03 There would be no significant changes in existing or future land use and development patterns as a result of this project. Recreation resources would be enhanced by the addition of open space at the conduit entrance and along the North Branch. Although these areas would be limited in size, these inundation areas provide opportunities in an area of the watershed where limited recreational opportunities exist. Decreased flood levels on Medicine Lake and Wirth Lake would provide some improvements for swimming and boating activities.

7.04 Biological communities and ecosystems would remain near their existing condition with regard to effects resulting from the proposed action. Short-term impacts to biological systems would primarily consist of impacts on water quality during construction and a short time afterwards. Long-term impacts on biological communities and ecosystems would be felt in the immediate area of the construction of the embankments and at the permanent impoundment site. There is also a long term commitment toward the maintenance of the project.

7.05 Impacts on social and cultural elements in the watershed would be adverse during the construction process, but would provide long-term flood protection benefits to both residential and industrial properties. Future development of the floodplain would be guided by existing floodplain regulations to prevent future flooding problems. Threats by periodic flooding to routine life-styles and cultural patterns would be substantially reduced.

8.00 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

8.01 Approximately 3 acres of vacant land would be covered by proposed embankments. Approximately 15 additional acres would be disturbed due to access and work space requirements. Land occupied by the embankments is biologically productive woodland and grassland. Ten acres of open area would be covered by a permanent wetland pond at the storage area near the conduit inlet. Excavation of approximately 250,000 cubic yards of earth would be required in the construction of storage area and improved culvert crossings.

8.02 About 26,000 cubic yards of material would be excavated between Douglas Drive and Louisiana Avenue North. Most of this would result from the removal of the Georgia Avenue crossing. Vegetation would be removed from about 1 acre of land at the embankment site. The removal of vegetation would have adverse effects on aesthetic and open-space qualities of the area. Adverse aesthetic impacts would occur at all embankment sites.

8.03 Fuels, equipment, construction materials, and human resources used in building the project would be irretrievably lost.

9.00 Coordination

9.01 Coordination with Federal and State agencies, elected officials, and citizen groups and interested individuals was initiated in the early stages of investigation for the Bassett Creek Flood Control Project. Realizing that the potential for flooding along the creek is increasing as urbanization of the watershed continues, the Bassett Creek Flood Control Commission was established in 1969 under the Joint Powers Act of the State of Minnesota. The commission is an organization composed of one member and one alternate from each of the nine municipalities in the watershed. The Joint Powers Agreement provides a basis for cooperation between nine municipalities in the investigation, planning, and implementation of flood control measures.

9.02 Workshop meetings were held in each of the communities of the watershed, except Medicine Lake, during the preparation of the environmental assessment to discuss the alternative flood control plans. These meetings were held by city planning commissions, environmental commissions, organized citizen advisory groups and groups of interested citizens and other local interests. All meetings included the informal evaluation and discussion of alternatives and the identification of the principle concerns of varying interests. Following distribution of the draft feasibility report and the draft environmental impact statement, a late stage public meeting was held in October 1975 to obtain the further views of all concerned interests on the selected plan.

9.03 The Draft Reports were coordinated with planning agencies, the U.S. Fish and Wildlife Service, and the Minnesota Department of Natural Resources. The requirement of the Fish and Wildlife Coordination Act for a Fish and Wildlife Report has been met.

9.04 The concerns of the Metropolitan Council and State Planning Agency have been considered and the selected plan seems to be acceptable to them. Letters have been sent to the State Archaeologist, State Historical Society, and National Park Service. These letters and responses are included in comment and responses section. Also, the Minnesota Department of Natural Resources and U.S. Fish and Wildlife Service have been contacted by telephone for the possible existence of threatened or endangered species of plants or animals.

9.05 Much of the material in the environmental assessment, prepared by Barr Engineering Company of Minneapolis under contract with the St. Paul District Corps of Engineers, was used in the preparation of the draft and revised draft environmental impact statements. Copies of the draft statement were furnished to the following for review and comment:

Honorable Hubert H. Humphrey, U.S. Senate
 Honorable Walter F. Mondale, U.S. Senate
 Honorable William Frenzel, U.S. House of Representatives
 Honorable Donald M. Fraser, U.S. House of Representatives
 Honorable Wendell Anderson, Governor, State of Minnesota
 U.S. Environmental Protection Agency
 U.S. Department of Agriculture
 U.S. Department of Commerce
 U.S. Department of Health, Education and Welfare
 U.S. Department of Housing and Urban Development
 U.S. Department of the Interior
 U.S. Department of Transportation
 Advisory Council on Historic Preservation
 Upper Mississippi River Basin Commission
 Minnesota Department of Agriculture
 Minnesota Department of Business Development
 Minnesota Department of Economic Development
 Minnesota Department of Health
 Minnesota Department of Natural Resources
 Minnesota Highway Department
 Minnesota Historical Society
 Minnesota Pollution Control Agency
 Minnesota Resources Commission
 Minnesota State Archaeologist
 Minnesota State Park Commission
 Minnesota State Planning Agency
 Minnesota Water Resources Board
 Minnesota-Wisconsin Boundary Area Commission
 Intergovernmental Planning, Minnesota State Planning
 Agency-State Clearinghouse
 Metropolitan Council-Areawide Clearinghouse
 Bassett Creek Flood Control Commission
 City of Crystal
 City of Golden Valley
 Village of Medicine Lake
 City of Minneapolis
 City of Minnetonka
 City of New Hope
 City of Plymouth
 City of Robbinsdale
 City of St. Louis Park
 Mr. John Derus, County Commissioner
 Mr. E.S. Robb, Jr., County Commissioner
 Mr. Lee W. Munnich, Jr., Alderman, Seventh Ward
 Hennepin County Department of Public Works
 Hennepin County Park Reserve District
 Hennepin County Soil and Water Conservation District
 Metropolitan Sewer Board
 Metropolitan Waste Control Commission

Minneapolis Park Board
 Minnesota Environmental Sciences Foundation, Inc.
 Minneapolis Star
 Minneapolis Tribune
 North Hennepin Post
 Sun Newspapers
 Environmental Quality Council, Citizens Advisory Council,
 St. Paul, Mn.
 Friends of the Earth, Minnesota Branch, Aitken, Mn.
 Izaak Walton League of America, Minnesota Division,
 Minneapolis, Mn.
 Minnesota Association of Watershed Districts, Minneapolis, Mn.
 Minnesota Environmental Control Citizens Association, St. Paul,
 Mn.
 Minnesota Environmental Defense Council, St. Cloud, Mn.
 Minnesota Environmental Sciences Foundation, Inc., Minneapolis,
 Mn.
 Minnesota Pheasants Unlimited, Minneapolis, Mn.
 Minnesota Public Interest Research Group, Minneapolis, Mn.
 Minnesota Waterfowl Association, Albert Lea, Mn.

9.06 In addition, copies of the draft statement were furnished to the following libraries where they were available as reference material.

Minneapolis Public Library
 Government Documents
 300 Nicollet Mall
 Minneapolis, Mn. 55415

Minneapolis Public Library
 Environmental Conservation
 Library of Minnesota
 300 Nicollet Mall
 Minneapolis, Mn. 55415

Hennepin County Library
 Brooklyn Center Branch
 5601 Brooklyn Blvd.
 Brooklyn Center, Mn. 55429

Hennepin County Library
 Golden Valley Branch
 830 Winnetka Avenue N.
 Golden Valley, Mn. 55427

Hennepin County Library
 Minnetonka Branch
 17507 Minnetonka Avenue
 Minnetonka, Mn. 55434

Hennepin County Library
 Robbinsdale Branch
 4915 42nd Avenue N.
 Robbinsdale Mn. 55422

Hennepin County Library
 Rockford Road Branch
 6401 42nd Avenue N.
 New Hope, Mn. 55427

Hennepin County Library
 St. Louis Park Branch
 3240 Louisiana Avenue S.
 St. Louis Park, Mn. 55426

9.07 Comments on the draft statement were received from the following:

- U.S. Environmental Protection Agency
- U.S. Department of Agriculture - Forest Service
- U.S. Department of the Interior
 - Bureau of Mines
 - Bureau of Outdoor Recreation
 - Fish and Wildlife Service
 - National Park Service
- U.S. Department of Transportation - Federal Highway Administration
- Advisory Council on Historic Preservation
- Metropolitan Waste Control Commission
- Minnesota Pollution Control Agency
- Minnesota Department of Natural Resources
- Minnesota State Planning Agency
- Minnesota Department of Highways
- Hennepin County Park Reserve District
- Metropolitan Council
- City of Golden Valley (Dr. Robert Hoover, Mayor)
- State Archaeologist
- Minnesota Historical Society
- Ms. Sandi Knudson
- Attorney for Wallace Freeman
- General Mills, Inc.

9.08 The letters of comment on the draft statement appear on the following pages with Corps of Engineers responses juxtaposed. Some comments related only to the Feasibility Report and those comments, as appropriate, were answered in that report. Copies of the Feasibility Report are available for review at the St. Paul Corps of Engineers District office.

9.09 Copies of the revised draft environmental impact statement and the final feasibility report were mailed to all known interests in July 1976 prior to review of these documents by the Board of Engineers for Rivers and Harbors and Office, Chief of Engineers. No changes in these reports were required and the revised draft statement was filed with the Council on Environmental Quality on 17 September 1976, and noted in the Federal Register as a draft statement. At that time the Office, Chief of Engineers again circulated copies of the revised draft statement and feasibility report for interdepartmental review. Letters of comment on the revised draft statement were received from the following.

- U.S. Environmental Protection Agency
- U.S. Department of Agriculture
- Minnesota Department of Natural Resources
- U.S. Department of the Interior

9.10 Copies of these letters and Corps responses begin on page 160 of this document.

LETTERS of COMMENT
and
CORPS RESPONSES

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Clearing and snagging, channel widening, removal of vegetation, construction of flood walls, and other modifications are proposed. These activities will make Bassett Creek hydraulically more efficient in conveying flood flows. Another ramification of these activities, however, will be an increase in the hydraulic capacity of the stream at all stages. Consequently, increased scour and erosion of the channel bottom and banks will be a continuing problem. Higher levels of turbidity and undesirable sedimentation will be related problems. Additionally, by increasing velocities, these hydrographic modifications will tend to increase the length of stream affected by whatever pollutants are entering the stream. The EIS should address these long-term impacts upon water quality. Measures which will minimize potential scouring and erosion caused by the project should be discussed in detail. The present plans for clearing and snagging include an area which is locally designated as the Brian Woods Bird Sanctuary. Based on views presented at the Joint Public Meeting dated October 15, 1975, the local residents, many of whom are affected by floodwaters, prefer to save the wildlife habitat in lieu of increasing the level of flood protection through clearing and snagging measures. Based on this information, we believe your office should reconsider these plans for clearing and snagging. If clearing and snagging measures must be conducted for this reach of stream, we suggest limiting removal to critical obstructions. If the plan is not changed, the Final EIS should recognize the effects of these measures on bank erosion, the loss of habitat, and the effects on the reduction of numbers and loss of diversity of fauna at the Brian Woods Bird Sanctuary.

Considerable wetlands are present along the upstream portions of the watershed based on topographic maps. It appears that channels have been dredged in many of these wetland areas. These channels have adversely affected the water holding capabilities of these wetland areas, as well as the use of these areas as sediment traps, the benefits of the wetland as nutrient sinks, and the quality of habitat. Since the proposed project will be designed to provide flood control, we believe it would be consistent with the purpose of the project to partially obstruct these drainage channels. Although the economic benefits related to flood control may not be significant, the cost of obstructing these drainage ditches would not be significant either. These benefits would be intangible and recognized as measures of enhancement.

From examination of the water quality data presented in the EIS and past experience and familiarity with the old drainage tunnel between Irving Avenue North and the Mississippi River, it is apparent that sewage and other pollutants are entering these drainage conduits. We recommend that all old pipes which are carrying sewage and other types of pollutants be sealed off and directed to proper sewer lines for treatment. The EIS should discuss the disposition of the old conduit with respect to this project.

3. Clearing and snagging has been deleted in the Brian Woods Bird Sanctuary. Channel construction activities would increase water quality problems during construction and for a short period afterwards until the area stabilizes. In the long-term, the riprap and flood walls would reduce erosion at critical areas. Flood flow velocities downstream of the proposed control structures would be reduced; however, low flow discharges would not be affected. Long-term impacts on water quality as a result of the project are minimal.
4. The cost of obstructing the many small drainage channels in the upper undeveloped portion of the watershed would not be significant; however, if these channels were obstructed as part of this project all lands which might be inundated because of the obstructions would either have to be purchased or easement obtained. The lands which would be inundated are privately owned and the cost of either would be substantial. Easements for temporary storage could be obtained in some cases at a much lower cost. The city of Plymouth does, however, intend to acquire many of these wetland areas and integrate them into their storm sewer drainage and part and open space program when development occurs in the area. The city plans to install control structures at the outlet of the wetland areas which would increase their storage capabilities and reduce the cost of other drainage facilities.
5. The disposition of the conduit is a responsibility of the city of Minneapolis. Drainage pipes entering the existing conduit would not be sealed. The old conduit would not be used to carry Bassett Creek flows.

The effect of the project upon groundwater is not adequately addressed in the EIS. Since the project will tend to increase groundwater recharge an expanded discussion of the impacts of the project upon groundwater quantity and quality should be provided. This discussion should include an evaluation of the water quality impacts of the conduit planned to be constructed through the St. Peter sandstone. With regard to the involvement of the Minnesota Department of Highways with the construction of this conduit, we submitted comments on the Draft EIS for I-94 on July 14, 1975 and asked that specific plans be formulated to contain any spillage of oils and other pollutants. Since the highway runoff from I-94 will affect the water quality of Bassett Creek, we believe the Final EIS should briefly describe these plans.

The proposed channel modification downstream from the Medicine Lake outlet require additional explanation. The impact of these modifications upon the 25 acres of wetlands adjacent to the area proposed for channel modifications and the impacts upon the lake's fishery from reducing seasonally high water levels contribute to spawning at wetlands adjacent to the lake are not adequately addressed in the EIS. The proposed channel modifications would result in a 0.5 foot reduction in the 100-year flood level on Medicine Lake which is sufficient to eliminate the existing flood damage to properties around the lake. Since most of the watershed upstream of Medicine Lake has not been urbanized, we suspect that the occurrence of high lake levels during flood periods is very similar to historical seasonal lake level fluctuations. The reduction of the 100-year flood level by 0.5 feet will effect the existing ecological condition of the lake. Based on a topographic map, we note that there is considerable wetland area adjacent to the north end of the lake. According to the EIS, Medicine Lake supports a fair to good northern pike fishery and that the northern pike utilize these wetland areas to spawn. If high lake levels are reduced, the EIS should address the permanent adverse environmental impacts upon the northern pike fishery. Since the northern pike fishery is very important to many of the residents living along the shore of the lake and those living nearby, we believe that the local residents should be made aware of the environmental effects upon the fishery resulting from the project. In addition, Section 101(a) of the Federal Water Pollution Control Act Amendments states that the objective of the Act is to restore and maintain the chemical, physical, and biological integrity of the nations waters. The northern pike fishery, the wetlands and the seasonal lake levels are all interrelated. We ask that the proposal to channelize the downstream reach below the Medicine Lake be reevaluated. With regard to this aspect of the project, we recommend the alternative of no action or floodproofing to preserve the biological integrity of the lake.

Flood plain regulation along the upper portion of the watershed will prevent future incompatible development in the flood plain. However, urban development on higher ground is likely to occur. The construction of parking lots, additional streets and other impervious surfaces associated with development will affect runoff characteristics. A more rapid stormwater runoff

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6. During construction, groundwater levels would be reduced in the immediate vicinity of construction areas because of lowering of water table. However, they would return to normal soon after construction. During flood periods groundwater levels would be slightly higher than normal in the vicinity of flood storage areas for several additional days. The existing recharge to aquifers during the periods would not be affected by the project.

The impacts of the Highway Department project would be discussed in their Environmental Impact Statement. At this time, the Department feels that the tunnels would have a long-term effect on groundwater and that highway drainage would have a long-term effect on Mississippi River water quality. The Highway Department is also preparing a Section 401 statement to the lower Mississippi River of their project on the St. Anthony Falls District in the

7. The adverse effects of lowering the flood level on the Mississippi River has been expressed by the Minnesota Department of Natural Resources and the U.S. Fish and Wildlife Service. Because of the adverse effects of lower flood water levels on the northern pike fishery, several alternatives have been investigated to avoid or minimize an acceptable degree of flood protection and also to meet a specific section 1, which is an acceptable alternative, would be a present outlet structure, require approximately 100 feet of the present parallel to the railroad embankment, and require a bridge replacement. This alternative is not as acceptable as flood proofing of homes with the replacement of the existing outlet structure. This alternative is part of the project as shown in the revised draft EIS.

8. Open space, and the maintenance of it, has many values and benefits. These values include economic, ecological, educational, recreational and its effect on the social well-being of the community. Transportation and the development of open space also has an effect on hydrologic processes including flood peaks and erosion. We have researched the issue and provide the following information:

Economic Value

Some scientists have emphasized the value of preserving the fresh-water wetlands which often comprise much of the floodplain (Hugo 1972, Thomson 1970, Wharton 1970). In urban environments, natural areas and open space take on values which are directly related to the well-being of man on a local scale (Shomon 1971, Wallace 1972). In an attempt to express the benefits that man receives from natural ecosystems in terms commensurate with the benefits used to justify land development, some have attempted to place monetary values on ecosystems based on energy flow (\$10,360/acre/yr. for a temperate deciduous forest, [Odum and Odum 1972]), water supply potential (\$2,800/acre/yr. for a typical freshwater wetland, [Larson 1973]), ability to process urban wastes (\$10,000-30,000/acre/yr. for a tidal marshland, [Ehrenfeld 1972; Schmid 1974]), and combined educational-water quality-water quantity-productivity value (\$3,125/acre/yr. for a southern river swamp, [Wharton 1970])¹.

Hamack and Brown (1974)² have attempted to put a value on waterfowl and wetlands. They concluded that, "Although we would not claim that the marginal value of a bagged waterfowl is \$3.10 or \$3.29, we would be very surprised if, in time, a more precise model were to produce a value for ducks much greater than this order of magnitude. Further, considering that pond costs as high as \$17 (on an annual basis—each pond about 1 acre in size) signal an increase in the number of ponds from recent annual counts, we would be most surprised if a more precise model were to indicate that existing permanent wetlands should be drained for agricultural use."

Urbanization and Hydrologic Processes

Precipitation

Urbanization of a forested watershed tends to reduce infiltration, soil-moisture storage, and evapotranspiration, and to increase overland flow and runoff. Interception may remain about the same.

condition will aggravate downstream flooding. The quantity and quality of urban runoff and its impact upon water quality should be discussed. As a measure to reduce future degradation from stormwater runoff, we recommend that the flood plain regulation plan should include provisions to require developers to construct stormwater detention basins where changes in runoff characteristics will occur. These detention basins will also have a beneficial impact upon water quality by acting as sediment traps and by reducing downstream scour and bank erosion.

¹ James, L.C., A.C. Benke, and H.L. Ragsdale 1975. Integration of Hydrologic, Economic, Ecologic, Social, and Well-Being Factors in Planning Flood Control Measures for Urban Streams, Georgia Institute of Technology. ERC-0375.

² Hamack, J. and G.M. Brown, Jr., 1974. Waterfowl and Wetlands: toward bioeconomic analysis. Resources for the Future, Inc.

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(Continued)

In urban areas, infiltration can range from zero on pavement and roofs to rates exceeding most rainfall intensities in those uncommon areas not subject to traffic of vehicles and people. Most lawns have surprisingly low infiltration capacities because their soils have often been man-mixed or bulldozed into position, and further compacted by frequent mowing and trampling. Overland flow from areas completely paved or roofed could amount to 90 percent or more of flood-producing rainfall. In St. Louis, Horner and Flynn (1936) found that the average ratios of runoff rate to rainfall rate were 0.4 where 30 percent of the area was impervious, 0.5 for 50 percent impervious, and 0.8 for 70 percent impervious.

Soil-moisture storage would also be affected by the proportion of impervious area. If, for instance, potential forest evapotranspiration during 3 hot summer days could provide 0.60 inch of storage opportunity, then per unit area the storage could be reduced to 0.45, 0.30, and 0.15 inch as impervious surfaces covered 1/4, 1/2, and 3/4 of the surface area and reduced evapotranspiration in proportion.

In the eastern forest region, urbanization may increase peak flows 1.5 to 4.5 times. For example, suburban development near Washington, D.C., increased impervious areas by 12 percent and flood peaks from drainage basins larger than 4 square miles by an estimated 1.8 times (Carter 1961). On Long Island, peak discharges with a recurrence interval of 1.15 years increased 2.3 times during a 21-year period of progressive urbanization (Sawyer 1961). In New Jersey, Potter (1957) found that the critical maximum annual peak for a 10-year recurrence interval for an urban-suburban watershed was 1.5 times greater than the peak derived from a regional prediction procedure based on watershed area and rainfall and storage indices. At Jackson, Mississippi, the mean maximum annual flood for a totally urbanized basin was about 4.5 times that from a similar but rural watershed (Wilson 1967).

Design peak runoff rates calculated by the rational method for urban and forest conditions give somewhat greater ratios. Peaks from urban areas 30 percent impervious were an estimated 4 times greater than peaks from flat areas of woodland on open sandy loam; for 50 percent impervious they were 5.5 times greater; and for 70 percent impervious they were 6.5 times greater (Schwab et al. 1957).³

³ Jull, H.W. and K.G. Reinhart. 1972. Forests and Flood in the Eastern United States. Northeastern Forest Experiment Station RP-N-226.

Erosion and Sedimentation

Urban land may produce either higher or lower erosion and sediment than farm or forest. For instance sediment from urban and suburban land of the Gunpowder Falls basin in Maryland was 50 to 100 tons per square mile per year as compared to about 50 tons from forest land and 1,000 to 5,000 tons from farmland (O'Bryan and McAvoy 1966). On any one area, probably nothing stabilizes the underlying soil as well as a substantial covering of asphalt or concrete; overland flow from these areas can erode unprotected soils downslope.

The stabilizing effect of urban development (though conservation measures also contributed) is illustrated by the reduction in sedimentation of Baltimore's Loch Raven Reservoir from an average annual rate of 185 acre-feet in 1914-43 to 41 acre-feet in 1943-61, a reduction of over 75 percent. Conditions in the period 1914-43 were described by Wolman (1968): "In Baltimore, in my youth . . . in some instances, water was squeezed out of the mud, instead of the sediment being removed from the water."

Sediment produced from urban areas comes largely from road and channel banks and from areas where construction is in progress. Topography appears to have considerable influence on sedimentation. In New Jersey moderately heavily urbanized flatland yielded 25 to 100 tons of sediment per square mile per year as compared to 75 to 500 tons from a heavily urbanized upland area (Anderson and McJill 1968).

An example of construction-caused erosion is the Lake Bancroft area near Washington, D.C., where 25,000 tons of sediment were deposited for each square mile of residential construction (Guy and Ferguson, 1962). In another housing project in the same area, the sediment load for the construction period averaged 121,000 tons per square mile (Guy 1965). Over the project area (20.5 acres) this would be equivalent to removal of about 1.1 inch depth of soil. (Lull and Reinhardt 1972)

Ecologic

When vegetation is removed and the percentage of impervious area increases, total runoff is greater, more of the runoff flows to the stream over the soil surface, and flood peaks come faster. After removal of vegetation in a small New Hampshire watershed, and without urbanization, Bormann and Likens found that total runoff volume increased about 40 percent. Furthermore, since runoff from upland areas must cross the floodplain en route to the stream and floodplains provide natural storage for overbank flow, open floodplain lands can serve a particular function in damping downstream flood

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peaks that natural uplands cannot. Also, some floodplain areas function in ground water recharge, and maintenance of natural vegetation is essential to this function.

Natural vegetation strongly influences the microclimate within cities. Since floodplains are usually considered less desirable for development than is nearby higher ground, floodplain ecosystems are often a significant portion of the natural areas remaining in cities. Due to evapotranspiration and shading, vegetation has a significant cooling effect during summer months. Vegetation also tends to act as a windbreak and consequently helps reduce dust in urban environments. It may also perform "purifying" functions against some air pollutants such as particulates and SO_2 . Its major effect is probably that of dilution of the community air pollution load.

Studies of island biogeography have shown that as land units get smaller and more isolated from other biotic communities, the biota becomes more and more impoverished with regard to number of species. This appears to happen in urban parks and natural areas as well as on islands. Wallace has suggested linking urban natural areas with corridors in order to preserve a diversity of desirable plant and wildlife species in urban areas. Because of their long narrow shape, forested floodplains which are often the last remaining natural areas in cities, can function as ideal wildlife corridors. In helping to maintain a high diversity, they further contribute to the long-term stability of the urban ecosystems.

Most potential plant and animal pests are subject to control or at least predation by natural means. Such control is mediated through complex multispecies interactions of natural biotic communities such as predation, parasitism and competition. When any of the interacting communities are affected as natural ecosystems are eliminated or stressed, the balance that once operated so well in nature to limit the growth of pest communities is destroyed. Species of insects, small mammals, birds, and plants can develop into uncontrolled pest populations. Maintaining locally diverse biotic communities in urban environments may help reduce the undesirable multiplication of certain pest species, but there have been no studies which have directly addressed this question.

Although urban floodplains are unlikely to contain any rare and endangered species of plants and animals, they themselves are often the last urban natural areas. Due to the scarcity of natural ecosystems in the urban man-made environment, they may be considered

CORPS RESPONSES TO THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
(Continued)

locally rare and endangered ecosystems and particularly valuable when they are easily accessible to inner-city residents. The relative importance of a given ecosystem for microclimate amelioration, pest control, and wildlife corridors depends to a large extent on its spatial relationship to other ecosystems and is increased with the loss of other urban natural areas (James, Benke and Ragsdale 1975).

Vegetation is not only an attractive feature of the landscape; in cities, it is also a very important buffer between residential and commercial or industrial development. The aesthetic, recreational, and educational benefits that humans derive directly from urban natural areas are enhanced by a greater diversity of species. Natural floodplains in residential areas are the principal exposure to nature for many city-dwelling children. As such, they provide important unstructured educational benefits as well as recreational opportunities for hikes, picnics, nature walks, etc. The importance of exposure to diverse natural phenomena to the mental well-being of the human population is little understood; but it is certainly great enough for planners to promote general access to natural areas for the entire urban population.

Flood proofing existing buildings does not directly harm any natural areas. As, however, flood damages are reduced, the flood proofing may encourage further development in the floodplain, and therefore, indirectly lead to the adverse affects of development (James, Benke, and Ragsdale 1975).

Social Well-Being

Many influential people in a wide variety of professions perceive a need to enhance the urban environment. The Executive Director of the American Society of Civil Engineers deplores the crime of constant exposure of children to noise, ugliness, and garbage in a plea for his profession to build better cities (Wisely 1970).

Sociologists have launched massive studies to test the hypothesis that "sociological conditions may influence, aggravate, or cause mental illness" (Srole et al. 1962) and into the types of mental problems to which specific conditions lead (Roberts et al. 1966; Taylor and Chave 1964). Ecologists are vocal in expressing alarm over the consequences of losing natural environments (Shepard and McKinney 1969) and go so far as to speak of such deficiencies as likely to lead to man's extinction (U.S. Department of Health, Education, and Welfare 1971).

CORPS RESPONSES TO THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
(Continued)

A number of interdisciplinary conferences have been held to discuss the effects of environmental degradation on mental well-being (American Psychological Association 1971; Kaplan 1971; Senn 1970). One of these suggested eight environmental characteristics as being particularly important to a sense of well-being among city dwellers:

(1) few exposures to hazards that incite worry over possible accidents, (2) storage of solid wastes, tools, and supplies in concealed locations, (3) plenty of sunshine and ventilation, (4) low noise levels, (5) provision for privacy in secluded outdoor areas by locating windows so as to make it difficult to see into a building from outside, (6) low air pollution levels, (7) provision of areas for outdoor play and relaxation, and (8) aesthetic satisfaction (Senn 1970, p. 43). The importance of using environmental design to reduce fatigue was particularly stressed.

The results of a study on community well-being as a factor in urban land use planning (James, Grogan, Laurent, and Baltimore 1974) indicate two principal functions that floodplains may serve in upgrading the urban environment. One is separation of residential from other use areas or from one another. The second is upgrading the environment and recreation opportunity within a residential use area. For smaller streams the separation of uses is best achieved by dense vegetation. If one side of a stream is in residential use, a design providing recreational access on a side toward homes and a vegetative barrier on the opposite bank has possibilities. Minimization of visual contact requires trees of building-top height planted in a belt of sufficient width to make it difficult to see through during the winter season. Floodplains containing unusual ecological combinations are best preserved as natural areas, but compatible recreation such as hiking or bird watching may be allowed.


The Briarwood bird sanctuary and marsh area at the outlet of Medicine Lake is a good example of open space being used for the separation of uses. Also, the marsh area is a unique or at least a declining ecological association in the Metropolitan Area and would be best preserved as a natural area.

⁴ James, L.D., D.R. Grogan, E.A. Laurent, H.E. Baltimore. 1974. Community Well-Being as a Factor in Urban Land Use Planning. Georgia Institute of Technology. ERC-0174.

We believe that good flood plain management should definitely be fostered in conjunction with the flood control project. Although a discussion of the flood plain regulators is included in the Feasibility Report, we believe the EIS should provide a brief summary of these regulations and a thorough discussion of the secondary or indirect impacts resulting from the implementation of these regulations.

We have classified our comments as Category ER-2. Specifically, this means we have environmental reservations about the effects of the project on wetlands and the effects of construction on water quality. We believe that additional information should be provided regarding these environmental impacts and we also request that consideration be given to enhancement measures. The classification and the date of our comments will appear in the Federal Register in accordance with our responsibility to inform the public of our views on major Federal actions. Please provide us with two copies of the Final EIS when it is submitted to the Council on Environmental Quality. If you have any questions concerning our comments, please contact Mr. Gary A. Williams at 312-353-5756.

Sincerely yours,


Donald A. Wallgren
Chief,
Federal Activities Branch

Maintaining floodplains as open land in the midst of an otherwise densely developed urban community may enhance the well-being of urban residents by an amount exceeding the amount of damage prevented. Planners should also recognize that urban floodplain benefits do not automatically result from floodplain development restrictions. The permitted uses must be chosen, and some arrangement must be provided that will keep the land in those uses from deteriorating to the point of adversely affecting the community. Floodplain land use needs to be integrated into the community land use pattern. (James, Benke, and Ragsdale 1975).

No definitive work is available on how the well-being of residents of an urban area are affected by the land use patterns surrounding them. A study by James, Brogan, Laurent, and Baltimore showed some benefits to a community if its overall environment is upgraded by improved recreational or aesthetic areas. These findings suggest an advantage to the community of developing floodplains along creeks between nonconforming land uses (residential and commercial areas) as visual and contact barriers and of developing floodplains within a given land use type in a way complementing that type such as neighborhood parks for residential areas and parking for commercial areas. This study also suggested beneficial effects of open space on the mental health of residents. Open space can also contribute to increased criminal activity such as robbery.

9. A discussion of the effects of floodplain regulations and flood insurance is presented on pages 35 and 36 of the draft EIS (pages 37 and 38 revised draft EIS). A general summary of floodplain regulations is presented in the revised draft EIS, page 37. Additional information is presented below.

The Minnesota Legislature, in enacting the Floodplain Management Act (Minnesota Statutes 1969, Chapter 590), recognized that floodplain management practices are necessary tools to protect human life and health and minimize property damages and economic losses. The basic purpose of floodplain regulation is not to prohibit, but to guide developments in floodplain areas consistent with nature's demands for the conveyance of flood flows and the communities' land use needs.

A designated floodway is the area of the channel of the stream and as much of the floodplain adjacent to the stream as is needed to convey flood flows or to provide flood storage without causing excessive increases in flood stages. Development within the floodway is limited to open space type uses having little or no flood damage potential and offering a minimum obstruction to the flow of floodwaters. Zoning is a legal tool used to implement and enforce the detailed plans resulting from a planning program.

CORPS RESPONSES TO THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
(Continued)

It is used by communities, counties, and agencies of the State to control and direct use and development of land and property within their jurisdiction.

Subdivision regulations and building codes set forth standards for construction to protect the health and safety of the public. These standards consider present flood levels and the effects construction would have on future flood levels.

Because of recurring flood problems in the watershed, the Bassett Creek Flood Control Commission in the "Watershed Management Plan for Bassett Creek", delineated the floodplain resulting from a 100-year storm over the ultimately developed watershed. To implement the management plan, the following policies regarding floodplain regulation were adopted by the Commission:

1. The floodplain of Bassett Creek is defined as that area lying below the 100-year flood elevations shown in the Management Plan of the Commission, or as subsequently revised due to channel improvement, storage site development, or requirements established by appropriate State or Federal governmental agencies.
2. No land use of a type which would be damaged by flood waters is permitted within the floodplain.
3. Allowable types of land use which are consistent with the floodplain, such as recreation areas, parking lots, storage areas, agriculture, and other open uses, would be allowed only to the extent that they would not increase flooding. Permanent storage piles, fences, and other obstructions which would collect debris or provide restriction to flood flows are not allowed.
4. Filling will generally not be allowed within that floodplain established in the Management Plan. If any municipality desires to fill within the established floodplain, such filling will require the approval of the Flood Commission and require provision for compensating storage. Other channel improvement so that the flood level shall not be increased at any point along the channel due to the fill.

CORPS RESPONSES TO THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
(Continued)

5. Local governmental ordinances regarding floodplain regulation, as required under the State of Minnesota Floodplain Management Act, will establish the guidelines for allowable floodplain development within each of the affected municipalities, with the provision that the proposed development in any area shall not conflict with the adopted Management Plan or Commission policy.

6. Expansion of existing non-conforming land uses within the floodplain will be prohibited.

To assist communities in the Bassett Creek watershed in the preparation and adoption of floodplain ordinances, the Commission prepared a model floodplain ordinance in 1974 to designate and regulate the use and development of the regional floodplain of Bassett Creek consistent with floodplain management criteria established by the Commission of the Minnesota Department of Natural Resources (Comm. Regs. SR 53.1.91). It is the intent of the model ordinance to establish a uniform floodplain management program for all municipalities having lands within the regional floodplain of Bassett Creek and to maximize the coordinated efforts of all members of the Bassett Creek Flood Control Commission in the management of the regional floodplain.

The regional floodplain consists of all lands within the watershed which are subject to flooding and which lie below the flood zone profile for Bassett Creek. To reduce flood damages and losses, uses susceptible to flood damage must be elevated or flood proofed to the "Regulatory Flood Protection Elevation", an elevation not less than one foot above the floodplain elevation. The following uses are permitted in the floodplain to the extent that they are not prohibited by any other ordinance, provided they do not require structures, fill, storage of materials or equipment, and provided they do not adversely affect the efficiency or unduly restrict the capacity of the channels or floodways of any tributary to the main stream drainage ditch, or other drainage facility or system:

- a. Agricultural uses, such as general farming, pasture, grazing, outdoor plant nurseries, horticulture, truck farming, forestry, sod farming or wild crop harvesting.
- b. Industrial-Commercial uses such as loading areas, parking areas, and airport landing strips.

COMPS RESPONSES TO THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
(Continued)

- c. Private and public recreational uses, such as golf courses, tennis courts, driving ranges, archery ranges, picnic grounds, boat launching ramps, swimming areas, parks, wildlife habitat, game farms, fish hatcheries, shooting preserves, target ranges, trap, and skeet ranges.
- d. Residential uses, such as lawns, gardens, parking areas, and play areas.

No temporary or permanent structure or fill for roads, levees, or other purposes, deposit, obstruction, storage of material or equipment, or other uses are permitted which acting alone or in combination with existing or reasonable anticipated uses would unduly affect the efficiency of the floodplain or unduly increase flood levels. Consideration of the effect of a proposed use shall be based on the assumption that there will be an equal degree of encroachment extending for a significant reach on both sides of the stream. Any such use which increases the floodplain elevation by more than 0.5 foot per reach or for the cumulative effect of several reaches is deemed to unduly decrease the capacity of the channel or floodplain.

The following uses may be permitted in the floodplain upon the issuance of a special permit:

- a. Filling is permitted by a municipality upon the approval of the Flood Control Commission and with the provision for compensating storage and channel improvement so that the flood level shall not be increased at any point along the channel.

- b. Structural works for flood control, such as dams, levees, dikes, and flood walls may be erected, provided that they will decrease the flood damage potential in the area.

- c. Public utilities, railroad tracks, streets, and bridges, provided they are designed to maintain increases in flood elevation and are in accordance with the Management Plan of the Flood Control Commission. Filling of private property shall be to the limit of flood protection available and no private property shall be destroyed or damaged.

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public facilities would endanger the public health or safety or where such facilities are essential to the orderly functioning of the area. Where failure or interruption of service would not endanger life or health, a lesser degree of protection may be provided for minor or auxiliary roads, railroads, or utilities.

An obstruction of structure, or the use of a structure or premises, which was lawful before adoption of the ordinance, but which is not in conformity with the provisions of the ordinance, may be continued subject to the following conditions:

- a. No such obstruction, use, or structure shall be expanded, changed, enlarged, or altered in any way without complying, in all respects, with the ordinance, including the obtaining of all required permits and variances.
- b. If such use of such obstruction or structure, or use of such premises, is discontinued for twelve consecutive months, any subsequent use of the obstruction, structure, or premises shall comply, in all respects, with the ordinance, including the obtaining of all required permits and variances.
- c. If any nonconforming obstruction or structure is destroyed or damaged by any means, including floods, to the extent that the cost of repairing or restoring such destruction or damage would be 50 percent or more of the cost of re-erecting a new obstruction or structures of like kind and quality and of the same physical dimensions and location, then it shall not be reconstructed, except in full compliance, in all respects with the provisions of the ordinance including the obtaining of all required permits and variances.

As part of the ordinance, enforcement and penalty measures are stipulated. "Any person who violates any provision of this ordinance or fails to comply with any of its terms or requirements is guilty of a misdemeanor punishable by a fine of not more than \$300 or imprisoned for not more than 90 days, or both. Each day such violation continues shall be considered a separate offense.

CORPS RESPONSES TO THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
(Continued)

Every obstruction or use placed or maintained in the floodplain in violation of this ordinance is hereby declared to be a public nuisance, and creation thereof may be enjoined, and the nuisance thereof abated by appropriate judicial action. Nothing herein contained shall prevent the city from taking such other lawful action as is necessary to prevent, remedy or remove any violation."

Of the nine communities in the watershed, Golden Valley, Minnetonka, New Hope, Robbinsdale, and St. Louis Park currently have floodplain ordinances in effect similar to the model ordinance, and the other communities are in the process of adopting floodplain ordinances.

Effective 1 July 1976, a portion of Bassett Creek and adjacent wetlands will be under the permit authority of the St. Paul District Corps of Engineers for placement of dredge and fill material. This permit authority stems from section 404 of the Federal Water Pollution Control Act Amendments of 1972. The portion of the stream that qualifies, must have a continuous low flow of 5 cubic feet per second for a designated period of at least 183 days of the year. At the present time it appears that only a portion of Bassett Creek between the Mississippi River and Wirth Lake will be subject to the Section 404 permit authority.

The selected plan for Bassett Creek will not be affected by the Section 404 permit program. However, anyone wishing to place dredged or fill materials in the qualifying portion of the stream or adjoining wetlands after 1 July 1976, must apply for a permit from the St. Paul District Engineer. The section 404 permit application will be processed jointly with the applicable State permit program permit application. For water quality reasons a permit may be required for other portions of the stream also.

Flood insurance is proposed in conjunction with floodplain regulations. Flood insurance is designed to compensate owners for losses due to floods. Additional information on flood insurance follows.

COMPS RESPONSES TO THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
(Continued)

Flood insurance, if established on a sound and equitable basis, could relieve the financial burden of flood damages and provide another supplement to programs for reducing flood damage. However, insurance rates should realistically reflect the flood risk to discourage improper development of floodplains. The National Flood Insurance Act of 1968 (P.L. 90-448) as amended, established a program of Federal assistance for flood insurance to be related to a unified national program for floodplain management. The flood insurance program makes available, under Federal auspices, specific amounts of flood insurance previously unavailable from private insurers. The act requires that State and local governments adopt and enforce regulatory measures that will guide land development in flood prone areas to avoid or reduce future flood damages.

As of June 1975, all of the communities in the Bassett Creek watershed, except Medicine Lake, had applied to the Department of Housing and Urban Development for the flood insurance program and are eligible under the emergency program. Under this program, flood insurance with subsidized premium rates is available on structures in amounts up to \$35,000 for single family dwellings and up to \$100,000 for multi-family and commercial properties. Insurance on contents is available to a maximum of \$10,000 per unit for residences and \$100,000 for nonresidential units. After flood insurance rate studies have been completed for these communities, coverage up to double the above amounts will be available at actuarial rates. As of June 1975, a flood insurance rate study was underway in St. Louis Park, and flood insurance rate studies were proposed for Minneapolis, Robbinsdale, Crystal and Plymouth.

The 1973 Flood Insurance Act changed the program in that newly constructed or substantially improved buildings in the special hazard area may still obtain flood insurance at subsidized rates until the rate study is complete. Another change in the law is that all building in the special flood hazard area in a participating community must be covered by flood insurance after 1 March 1974 to be eligible for any form of mortgage loan from a federally insured or supervised bank, a savings and loan association, or from any Federal agency. After 30 June 1975, or 1 year after a community's initial notification of being flood prone, no loans will be approved in designated special flood hazard areas unless a flood insurance policy is purchased.



DEPARTMENT OF THE ARMY
ST. PAUL DISTRICT ENGINEERS
1135 U. S. POST OFFICE & CUSTOM HOUSE
ST. PAUL, MINNESOTA 55101

IN REPLY REFER TO
NCSED-LR

29 April 1976

Mr. Merle W. Telleson
Chief, Federal Activities Branch
U.S. Environmental Protection Agency
Region 5
240 South Dearborn Street
Chicago, Illinois 60604

Dear Mr. Telleson:

We wish to advise you of a change in the Medicine Lake portion of the plan for flood abatement reduction in the Bassett Creek Watershed, Hennepin County, Minnesota. The reason for the change is that the original plan for lowering flood levels on Medicine Lake would have adversely affected more riparian areas. This problem was pointed out in Mr. Wallach's letter of 13 November 1975 as well as in letters from the U.S. Fish and Wildlife Service and the Minnesota Department of Natural Resources.

In response, the plan for Medicine Lake has been modified. The following is a description of the modified plan as it will appear in the revised draft environmental impact statement.

"A new outlet structure would be constructed for Medicine Lake and the existing structure would be removed. The new structure would consist of a 20-foot concrete overflow weir and a 360-foot overflow embankment. It would be located approximately 500 feet downstream of the existing outlet structure but directly upstream of the Minnesota Western Railroad embankment. To further the structure, increased discharge capacity would be provided by flood storage without affecting riparian areas. The new structure would reduce the 100-year flood level events at a distance of less than a 20-year frequency would not be affected. The total reduction of elevation of approximately 0.89. The proposed outlet structure would reduce the 100-year flood level on Medicine Lake approximately 0.5 feet below the existing 100-year flood level."

This plan was developed in cooperation with the Bassett Creek Flood Control Commission, and the revised flood profiles and embankment location have been discussed with the Minnesota Department of Natural

WGSJH-26

29 April 1975

Mr. Herrie W. Tellefsen

Resources and the U.S. Fish and Wildlife Service. This is the same as for the Medicine Lake portion of the plan which would provide no more than a spawning condition. The wetland area would cover about 0.2 acre of Type 2 wetland and would result about 0.1 acre of Type 2 wetland to Type 3 or 4. Although the wetland effects are not mentioned in communication letters to date, they have been discussed with the Minnesota Department of Natural Resources and the U.S. Fish and Wildlife Service and the adverse wetland effects appear to be an acceptable trade off for spawning area protection.

As a point of explanation, the adverse wetland effects are the reason that the Environmental Quality (EQ) plan involved flood proofing of about six houses rather than leaving flood levels on Medicine Lake. Local interests have indicated that the flood proofing is unacceptable to them, however. Please note that the EQ plan now also includes replacement of the Medicine Lake outlet structure and fish barrier at its present location. (This was not part of the EQ plan in the draft reports which you reviewed.)

The recommended plan was developed as a first-cut compromise between what is environmentally acceptable and what is acceptable to the affected residents. Further studies during the postauthorization stage are needed to develop a flood damage reduction plan with lesser environmental effects in this area.

We are informing you of this situation since your agency has an interest in the protection of wetlands and other natural resources.

Sincerely,

Forrest T. Gay, III

FORREST T. GAY, III
Colonel, Corps of Engineers
District Engineer

CT:
U.S. Fish and Wildlife
Service
Minnesota Department of
Natural Resources

UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

NORTHEASTERN AREA, STATE AND PRIVATE FORESTRY
6816 MARKET STREET, UPPER MERION, PA. 19082

(215) 596-1671

8400

November 3, 1975



Max W. Noah, Colonel
Corps of Engineers
District Engineer
St. Paul District
1135 U.S. Post Office & Custom House
St. Paul, MN 55101

Refer to: NCSED-ER Draft
Environmental Statement,
Basset Creek Watershed, MN

Dear Colonel Noah:

Our Milwaukee office has forwarded the above statement to us for review and comment as no National Forests are involved.

Maps of the area are greatly reduced to fit the format of the publication and much detail is lost. It is not clear where the eastern end of the project is located between the Mississippi River and Wirth Lake.

The Impact Section of the statement refers to "minimizing" disruption of wildlife habitat. The final statement should give an estimate of the proportion of habitat that will be irretrievably lost to that use.

Parts of the Impact Section mention clearing of debris but we find no discussion of locations and methods of disposal. Erosion control measures in connection with debris removal and during construction of embankments and other structures should be discussed.

Thank you for the opportunity to review this Draft Statement.

Sincerely,

[Signature]
DALE O. VANDENBURG
Staff Director
Environmental Quality Evaluation

CORPS RESPONSES TO THE UNITED STATES DEPARTMENT OF AGRICULTURE -
FOREST SERVICE - NORTHEASTERN AREA, STATE AND PRIVATE FORESTRY

Flood insurance does not prevent flood damages but does assist in reimbursing affected property owners for losses sustained from flood damages. Flood insurance is most effective when utilized in conjunction with floodplain regulation and other measures. If insurance is properly administered, all premiums except that portion used for administration would be returned to property owners through payments for damages. Thus, the costs of insurance protection, if profit margins are small, only slightly exceed the benefit to the insured.

See also responses to General Mills, Inc., and attorneys for Wallace L. Freeman letters of comment.

10. Enlarged plates have been included in the revised draft environmental impact statement.

11. Some of the impacts on wildlife habitat would be temporary such as in the replacement of culverts. These areas would be relandscaped and soddied. Long-term impacts on wildlife would occur at the 10-acre permanent impoundment at the conduit entrance and at riprapped and embankment areas where vegetation would be controlled. The embankments at various locations (which cover a combined area of about 3 acres) would be grass-covered. Woody vegetation would be controlled. Vegetation that would be destroyed at access points, which have not been determined yet, would be replaced. Clearing and snagging near the conduit entrance would be about 0.6 mile long. This would involve the removal of man-made debris, natural debris, and trees in danger of falling into the channel. The proposed project would destroy about 15 acres of terrestrial wildlife habitat for embankments, channel widening, and access and work space. Some of this habitat would be lost in the lower watershed which is highly urbanized and has a low proportion of natural or undeveloped areas. Removal of vegetation and reduction of floodwater levels would result in additional loss of wildlife and fishery habitat. Sections 4, 5, 7, and 8 of the revised draft EIS have been expanded to reflect these losses.

12. The cleared debris would be disposed of in landfills located within and outside the watershed. (See also response number 2.) The method of disposal would be determined during postauthorization studies.



United States Department of the Interior

BUREAU OF MINES

BUILDING 20, DENVER FEDERAL CENTER
DENVER, COLORADO 80225

Intermountain Field Operations Center

Office of
Chief

October 14, 1975

Colonel Max V. Noah
District Engineer, St. Paul District
U.S. Army Corps of Engineers
1135 U.S. Post Office and Customs House
St. Paul, Minnesota 55101

Dear Colonel Noah:

Personnel of the Intermountain Field Operations Center have reviewed the Corps' draft environmental impact statement and feasibility report for flood control on Bassett Creek watershed, Hennepin County, Minn. (EIS-75/926), as requested by Bruce Blanchard, Director, Office of Environmental Project Review, U.S. Department of the Interior, on September 23.

In general the documents are clear, concise, well written, and well organized. The technique of utilizing a three-document framework, in which supporting data, environmental aspects, and feasibility studies are presented separately, is particularly refreshing and appropriate. Such an approach avoids redundancy in the individual documents and expedites our review process.

In view of the scope and location of project measures, we anticipate that the project will have no adverse impact on mineral resources and related industries in the watershed, and we have no objection to the project or the documentation.

One of the major facets of the Corps watershed studies conducted for the project area concerns the interrelationship between advance planning and the potential for increased runoff that will result from anticipated urbanization of the watershed. The hydrologic study (section H-appendix 1)

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CORPS RESPONSES TO THE UNITED STATES DEPARTMENT OF THE INTERIOR -
BUREAU OF MINES, INTERMOUNTAIN FIELD OPERATIONS CENTER

13. A short discussion of the general effects of urbanization on hydrologic processes and open space qualities is presented in the response to the U.S. Environmental Protection Agency letter of comment. See responses numbers 8 and 9.

acknowledged that the watershed is rapidly urbanizing, that progressively larger discharges are expected as urbanization increases, and that runoff-urbanization models have been compiled for the watershed. Such modeling studies provide a valuable data base for wise and judicious flood plain management planning, and although development of flood plain regulations is the responsibility of local governments, we suggest that the Corps attempt to prevail upon them to utilize such information.

Sincerely yours,

Raymond L. Lowrie

cc: Special Assistant to the Secretary, North
Central Region, Chicago, Ill.



United States Department of the Interior

DEPARTMENT OF THE INTERIOR

WASHINGTON, D. C. 20540

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Colonel Max H. Boyd
District Engineer
U.S. Army Corps of Engineers
St. Paul District
1115 E. W. Post Office Building
St. Paul, Minnesota 55101

Dear Colonel Noah:

In response to your request, we have reviewed the preliminary feasibility report and first environmental impact statement for the Flood Control, Settlement and Development Project, Minneapolis, Minnesota. The following comments are provided to assist you in preparing revised drafts of these documents. Official Department of the Interior comment will be made when the Department is requested to make a formal review.

Feasibility Report

The report should make reference to the Twin Cities Level B study. Any proposed developments should be coordinated with the final Level B report to assure compatibility with the recommendations of the study.

Several alternatives, including the selected plan, involve flood storage in Jordan Park (Bassett Creek Park) and Brookview Community Park. Portions of these parks have been acquired with monies from the Land and Water Conservation Fund (LWCF), administered by the Bureau of Outdoor Recreation (Project 27-00600, Jordan Park and Project 27-00267, Brookview Recreation Area). The report should indicate LWCF involvement in these parks. The feasibility report states that an earthen embankment will be constructed on the eastern boundary of Jordan Park. The dimensions of this embankment (height, number of acres of parkland required) should be indicated. The Existing Land Use Map (Plate B-5) could also be revised to show the present boundaries of Jordan Park. The use of these two parks for flood storage and, in the case of Jordan Park, for an embankment may constitute a change in land use.



Any changes in land use within a park funded with Land and Water Conservation Funds creates a 6(f) conflict. Section 6(f) of the Land and Water Conservation Fund Act states that "no property acquired or developed with assistance under this section shall without the approval of the Secretary of the Interior be converted to other than public outdoor recreation uses. The acceptable means of satisfying such a conversion is the substitution of other recreation lands of at least fair market value and of reasonable equivalent usefulness and location."

We have informed Mr. James T. Solem, Director of the State Office of Local and Urban Affairs in St. Paul, Minnesota, of these potential conflicts. Any plans for these parks should be coordinated with his office. He can be reached by calling 296-2107.

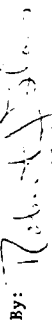
Draft Environmental Statement

The environmental impact statement should make reference to the Twin Cities Level II Study. The possible involvement with Section 6(f) of the Land and Water Conservation Fund Act, relative to Jordan Park and Brookview Recreation Area, should be discussed and the impacts of that involvement included in the section on impacts on recreation.

Please feel free to contact this office if you have any questions on the potential 6(f) conflict.

Sincerely yours,

JOHN D. CHERRY
Regional Director

By: 
Robert J. Blais
Acting

Conservation and Recreation Planning Division
State Office of Local and Urban Affairs

15. The Level II study is housed in the revised draft site plan, paragraph 3.06, page 17.

16. During general design stages, further coordination will be carried out with the Bureau of Outdoor Recreation to resolve this potential conflict. (See also the following letter from the State Office of Local and Urban Affairs.)

OFFICE OF LOCAL AND URBAN AFFAIRS

MINNESOTA STATE PLANNING AGENCY • ST. PAUL, MINNESOTA • 55101

February 2, 1976

District Director
U.S. Army Corps of Engineers
St. Paul District
Post Office & Custom House
180 E. Kellogg Blvd.
St. Paul, Minnesota 55101
AFN: Bob Steniors

Dear Sir:

Enclosed are my comments to the Bureau of Outdoor Recreation concerning the possibility of a Section 6(f) conflict of use resulting from the proposed Corps of Engineers flood control project on Bassett Creek. It is my opinion that no conflict will occur and have stated such.

The BOR will review my comments and make the final determination. If there are any questions regarding this matter or my letter, feel free to contact me at 296-5701.

Sincerely,

Louis J. Luebke

Louis Luebke
Regional Director
Parks and Recreation Grants Section

LJ/rlb

Enc.

U.S. DEPARTMENT OF THE INTERIOR

OFFICE OF LOCAL AND URBAN AFFAIRS
MINNESOTA STATE PLANNING AGENCY • ST. PAUL, MINNESOTA 55403 • TEL. 225-1100

January 29, 1976

Mr. John D. Cherry
Regional Director
Bureau of Outdoor Recreation
3853 Research Park Drive
Ann Arbor, MI 48106

RE: Possible Section 6(f) Conflicts Occurring on 1427-00600 and 1427-00767

Dear Mr. Cherry:

The question has arisen concerning a possible section 6(f) conflict between the project from a U.S. Army Corps of Engineers flood control project and the project 1427-00600. This project has involved two U.S. Army Corps of Engineers flood control projects, 1427-00600 and 1427-00767. Portions of both parks have been designated as critical flood storage areas while 1427-00600 has also been selected for the project as a flood control enhancement.

Though flooding along Bassett Creek has always been of short duration, the creek flows through a highly developed section of suburban Minneapolis. The Corps is obvious potential for extensive flood damage to homes and businesses near its banks. Recent flooding has caused a demand from the residents that something be done on Bassett Creek to control the flood waters. In response, the Army Corps of Engineers has prepared a draft feasibility report for flood control. This report contains the plans for 1427-00600 and 1427-00767.

After discussing details of the flood control project with R. Earl Smith, Chief of the U.S. Army Corps of Engineers, present and future plans for the project at Braddon, Capital Park Superintendent, and other park officials, in portions, I have drawn a few conclusions.

The water storage area on 1427-00600 will require no construction, maintenance, or park. It will merely be used as an area for excess water to be held during a course of a flood. As the flood waters recede, water will drain off the storage area and gradually Bassett Creek will return to its banks. The flood storage area will dry out completely and the entire area will be available for normal recreational purposes. The elapsed time from the beginning of a flood to complete drainage is, at the most, one week. The water will not interfere with any development on the site.

Mr. John D. Cherry
Page 2
January 29, 1976

The proposed embankment for LM27-006000 will be located in the southeast corner of the park area with the major portion of the embankment not within park boundaries. The elevation at the top of the embankment will be approximately at 850 ft. (above sea level). The embankment will allow this area to be used as a flood water storage area while also protecting existing housing. Again, the flood water will remain less than one week in storage. The embankment will measure approximately 10 feet wide at the top, 20 feet wide at the bottom, and average about 6 feet high. It will not restrict use in the park in any way and will not be located near any present or future development. (Incidentally, all future development will be placed at an elevation above 850 feet with the exception of a trail on the creek bed). Although, the City of Crystal does not plan to utilize the bank as a trail path, the potential does exist. The embankment will be completely landscaped to include grass, trees, and perhaps shrubs or bushes. A trail along the park won't suffer because of it's presence.

In conclusion, it is my opinion that neither utilizing LM27-006000 and LM27-006000 as water storage areas for one week per year nor the construction of the proposed embankment constitutes a section 6(f) conflict as defined in in part 7A-5, part 685.2.1 of the Land and Water Conservation Fund Grant Manual. I have also enclosed a map of LM27-006000 illustrating the embankment for your review. Please contact me if you have any further questions.

Sincerely,

Louis Jambola
Project Officer
Parks and Recreation Grants Section

LJ/pbb

Enclosure



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Federal Building, Fort Snelling
Twin Cities, Minnesota 55111

IN REPLY, REFER TO

ES-FWP

OCT 1 1975

Colonel Max W. Noah
District Engineer
U. S. Army Engineer District
St. Paul
1210 U. S. Post Office & Custom House
St. Paul, Minnesota 55101

Dear Colonel Noah:

This responds to your letter of September 9, 1975, requesting our review of the draft Feasibility Report and draft Environmental Impact Statement for the proposed Flood Control Project on Bassett Creek, Hennepin County, Minnesota. Our comments are submitted in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) and the National Environmental Policy Act of 1969. They are provided for technical purposes only, and do not necessarily represent the views of this Service and the Department of the Interior in respect to a review of the final documents.

DRAFT FEASIBILITY REPORT

The plan tentatively selected as best meeting the flood control needs of the watershed contains a combination of structural and non-structural features. The principal flood control features include the construction of a new conduit in the right-of-way of the proposed Third Avenue highway distributor; increased temporary floodwater storage in several golf courses, parks, and wetland areas; selected channel clearing and debris removal; relocation of two homes and flood proofing of nine others; modification of the outlet of Medicine Lake and immediate downstream channel; continuation of flood plain regulations and insurance programs; and development of a recreational bicycle and walking path.

In general, the plan tentatively recommended in the report appears to adequately resolve the flood control problem with minimal adverse environmental impact. There are several desirable features in the tentative plan that would directly benefit fish and wildlife populations. The 20-acre, Type IV and/or Type V wetland "ponding" area created at the inlet to the proposed conduit would provide valuable habitat for "urban" waterfowl, particularly the expanding Canada goose population. The relocation of several homes is a positive approach to solving long-term flood plain problems. Perhaps several of the nine homes to be flood proofed also could be relocated. With a benefit/cost ratio of 1.9, some additional costs resulting from home relocation may be acceptable.



CORPS RESPONSES TO THE UNITED STATES DEPARTMENT OF THE INTERIOR -
FISH AND WILDLIFE SERVICE

17. While floodplain evacuation is a positive approach to solving the long-term flood problems, more extensive evacuation in the Bassett Creek watershed would result in severe adverse social impacts and is socially unacceptable to the people being protected. Only in those areas where individual homes or businesses must be removed to construct flood control works or where they cannot be economically protected by other measures is floodplain evacuation a viable solution to the flood problems in the Bassett Creek watershed.

2

The use of parks and golf courses as temporary floodwater storage areas are acceptable and appropriate functions of a flood plain.

We are pleased that the citizens of the area, through several public meetings, have indicated that channel modifications and realignments are unacceptable and, wherever possible, the creek should be left in its existing state. We support this view.

The Twin Cities Metropolitan Council and the City of Minneapolis have expressed interest in an open space proposal calling for the development of a Bassett Creek Parkway. Consideration of this proposal may depend upon the results of the Open Conduit Feasibility Study being conducted by the City of Minneapolis. The total development of a parkway and open conduit would protect and enhance the natural environment of the creek, including fish and wildlife resources. As such, we urge you not to make a final decision on the recommended plan until after this study has been completed and reviewed.

19. The feasibility report indicates that the water quality of Wirth Lake has deteriorated significantly and that the process of eutrophication is accelerating. Water quality testing on the stream should continue in an effort to locate and abate water pollution sources. Alternatives, such as "no action" or channelization would further degrade the lake's water quality, and would be unacceptable to us. Efforts should be made to improve the aesthetic and fish and wildlife values of the lake.

20. Page 17 of the report indicates that, in general, recreational facilities available to the general public in Hennepin County are adequate to meet existing needs. On November 26, 1974, the Metro Council conducted a public hearing on its proposed Recreation Open Space Development Guide/Policy Plan. Mayor Hofstede of Minneapolis indicated that quality of existing open space is deteriorating as a result of increased human use and demand. Mayor Hofstede also recommended the addition of the Bassett Creek Parkway to the open space proposal. The net impact of acquiring and developing Bassett Creek as a parkway generally will benefit fish and wildlife resources by permitting the preservation and rehabilitation of the natural environment. The future recreational needs of the area should be investigated further and discussed in the report.

Also the report on page 15-17 does not indicate clearly the diversity of wildlife species present in the study area. Actually, 282 species of birds, 96 species of fish, 57 species of mammals, and 33 species of amphibians and reptiles occur in the seven-county Metropolitan area. Certainly a major portion of this variety can be found in the Bassett Creek Watershed as evidenced by the diversity of habitat present.

18. The Open Conduit Feasibility Study being conducted by the city of Minneapolis may or may not find the open space proposal feasible. However, city officials view the open space proposal as a long-range planning proposal since it would take several years to acquire the necessary right-of-way and to complete the plans. Delay in recommending a plan for the reduction of flood damages would allow the social and economic burden of flooding on residents of the watershed to continue, particularly in the commercial and industrial area near the inlet to the existing conduit. Should the existing conduit fail during a major flood event, flooding would occur in the vicinity of the conduit inlet. Construction of a new conduit in cooperation with the Minnesota Highway Department provides a dual purpose facility at a significant cost saving to the taxpayers when compared to separate facilities. Delay in recommending a plan for the Bassett Creek watershed would result in the loss of the opportunity to construct this dual purpose facility which would provide immediate flood damage reduction and significantly reduce the threat of flooding in the vicinity of the conduit inlet. Construction of the new conduit in cooperation with the Minnesota Highway Department would not preclude the future development of an open space-open channel corridor should the Open Conduit Feasibility Study find the proposal to be feasible and the proposed new conduit could continue to function as a flood control structure to reduce the threat of flooding in the city of Minneapolis. However, no flood control benefits may no longer be available.

19. The water quality monitoring program initiated by the Bassett Creek Flood Control Commission in 1972 has identified general water quality problem areas throughout the watershed. The water quality monitoring program currently being undertaken by the Bassett Creek Flood Control Commission is intended to locate the sources of nutrient loading, and, with the cooperation of the Minnesota Pollution Control Agency, improve the existing water quality throughout the watershed including Wirth Lake. See also comment and response number 34.

20. During the course of this study, parks and recreation directors from each of the municipalities except Medicine Lake were interviewed. The purpose of these interviews was to identify the recreational resources of the watershed as well as any existing or future unmet recreational needs. In response to these unmet recreational needs in the city of Minneapolis, the recommended plan includes approximately 10,000 feet of bike-way and walk path along the creek corridor including a link to nearby Bryn Mawr Meadows Park. During advanced design studies, coordination will be maintained with local, regional, State and Federal agencies to assure that any future needs which can be satisfied as part of the project would be identified.

21. The report has been revised to reflect comment: pages 15 and 16.

COMPS RESPONSES TO THE UNITED STATES DEPARTMENT OF THE INTERIOR -
FISH AND WILDLIFE SERVICE (Continued)

3

22 The outlet of the 915-acre Medicine Lake will be repaired; and 500 feet of channel immediately downstream from the outlet will be deepened to reduce the 100-year flood level of Medicine Lake by 0.5 feet as indicated on page 78 and 79. Such a reduction in the 100-year flood level would help prevent flood damage now occurring around the lake. Unfortunately, the lowering of the lake during the spring flood period also would result in the loss of natural northern pike spawning areas present along the edge of the lake. Two major northern pike spawning areas occur on the lake on the north end and on the southwest end of the lake. According to the Minnesota Department of Natural Resources (MDNR), the lake is at near optimum northern pike production condition and is currently providing excellent fishing-use opportunities.

Since the proposed project on Medicine Lake would have an adverse impact on fisheries, compensatory action is required to protect existing environmental quality, economic, and social well-being benefits.

23 The loss of the valuable northern pike spawning areas in particular would be a project responsibility. We recommend that a controlled northern pike spawning area in conjunction with a carp barrier be constructed on the lower 1 mile of Plymuth Creek, upstream from Medicine Lake. To compensate for the loss of northern pike spawning areas on the lake, the proposed lowering of the 100-year flood level. These developments should be closely coordinated with the Minnesota Department of Natural Resources.

The proposed underground conduit outlet to the Mississippi should be designed as a fish barrier to prevent movement of fish upstream from the Mississippi River. At high stream flow conditions, velocities in the long conduit will stop upstream migration, but at low flows a 3-4-foot vertical drop will be needed somewhere in the conduit. A barrier in the conduit also will provide for application of selective carp toxicant to the watershed.

DRAFT ENVIRONMENTAL IMPACT STATEMENT

Our comments regarding the Feasibility Report also apply to the draft statement.

In general, the Environmental Impact Statement provides a list of reasonable and environmentally acceptable alternatives to the problem of flood control on Bassett Creek. A balance of structural and non-structural flood control alternatives is apparent in the proposed plan.

The description of fish and wildlife resources is inadequate somewhat and should be expanded. No mention is made of the project's effect on the fisheries and associated recreational-use opportunities of Medicine Lake. As indicated in the Feasibility Report, the lowering of the 100-year flood level of Medicine Lake by 0.5 feet would have detrimental

24 Further coordination with representatives of the Fish and Wildlife Service and the Minnesota Department of Natural Resources resulted in a revision of the proposed outlet of Medicine Lake so that the outlet would be at the flood level of 100 years flood. This outlet is at the same elevation as the outlet of the lake. It is intended that the proposed new conduit be designed to provide an effective fish barrier.

25 The sections on recreation and wildlife have been expanded to include pages 14, 16, 17 and 18.

CORPS RESPONDS TO THE UNITED STATES IN INTEREST OF THE INTERIOR -
FBI AND A POLICE SERVICE (Continued)

effects in the northern pine growing areas. This action would be thoroughly discussed in the final general impact of the strip setting. In our review of the feasibility, Special Species, and transfer of the project, this matter was ruled. The proposed project would be subject to include the same recommendations. The total impact of the action is discussed in Medicine Lake. Close coordination of all work with the Minnesota Department of Natural Resources.

in reply, urging

14

Deputy Director



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Fisher Building, Fort Snelling
Saint Paul, Minnesota 55101

LWR

FEB 1 1976

Colonel Forrest T. Gay
District Engineer
U.S. Army Engineer District
St. Paul
1135 U.S. Post Office and Custom
House
St. Paul, Minnesota 55101

Dear Colonel Gay:

This letter supplements our views of October 9, 1975, regarding the draft Feasibility Report and draft Environmental Impact Statement for the proposed Flood Control Project on Bassett Creek, Hennepin County, Minnesota. These comments are provided for technical purposes only and do not necessarily represent the views of this Service and the Department of the Interior in respect to a review of forthcoming final documents.

Our October 9, 1975 letter expresses concern regarding the proposed modification of the outlet of Medicine Lake and its subsequent effect on an existing high quality northern pike fishery. The originally proposed modification would reduce the 100-year flood level of Medicine Lake by 0.5 feet or more. Such a reduction in the 100-year flood level would help prevent flood damage now occurring around the lake. Unfortunately, the lowering of the lake during the spring flood period also would result in the loss of natural northern pike spawning areas present along the north end and southwest end of the lake. According to the Minnesota Department of Natural Resources (DNR), the lake is at near optimum condition for northern pike production and currently provides excellent fishing.

We recommended in October that a controlled northern pike spawning area in combination with a carp barrier be constructed on the lower 1 mile of Plymouth Creek, upstream from Medicine Lake, to compensate for the loss of northern pike spawning areas on the lake due to the proposed lowering of the 100-year flood level.

Since then, we have met with your staff, the Bassett Creek Flood Control Commission and the Minnesota Department of Natural Resources to resolve this matter. Revised and more accurate stage frequency curves for Medicine Lake were reviewed. As a result, a new proposal to modify the outlet of Medicine Lake was agreed upon which would not

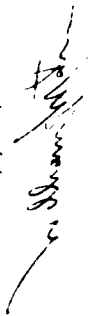


affect the current spring high water levels below the 20-year flood frequency. This would insure adequate water conditions for next years over the existing northern pike spawning areas.

If the location and design of the outlet of Medicine Lake are modified these mutually agreed upon flood stage frequency conditions, the existing northern pike spawning areas can be adequately protected, while also reducing flood water damage resulting from the occasional 100-year flood. This modification would satisfy adequately our concerns regarding the Medicine Lake northern pike fishery. These developments should be coordinated with the Minnesota Department of Natural Resources.

We look forward to continued coordination in seeking acceptable flood damage alternatives in the Bassett Creek Watershed.

Sincerely yours,



cc: Minnesota DNR, St. Paul



United States Department of the Interior

NATIONAL PARK SERVICE

MIDWEST REGION
1709 JACKSON STREET
OMAHA, NEBRASKA 68102

IN REPLY REFER TO

L7619 MWR CE

AUG 1 9 1975

Your Reference
NCSED-ER

Colonel Max W. Noah
District Engineer
St. Paul District, Corps of Engineers
1135 U.S. Post Office
St. Paul, Minnesota 55101

Dear Colonel Noah:

We are pleased to respond to your request of August 12 for our comments concerning the existence of historic, archeological and paleontological resources in the Bassett Creek Watershed, Hennepin County, Minnesota.

No unit of the National Park System or any National Landmark would be affected by the proposed project. We are, however, unable to provide detailed information on any resources within the watershed that might meet the criteria for addition to the National Register of Historic Places and suggest that you be guided in this regard by the recommendations of the State Historic Preservation Officer and the State Archeologist.

Sincerely yours,

Merrill D. Beal

Merrill D. Beal
Regional Director





United States Department of the Interior

NATIONAL PARK SERVICE

WASH. D.C. 20540

IN REPLY, REFER TO:

10610-106R (7)
18-77-926

Your reference:
RCHB-1R

Colonel Max W. Noah
District Engineer
St. Paul District, Corps of Engineers
1115 U.S. Post Office
St. Paul, Minnesota 55101

Dear Colonel Noah:

The National Park Service has reviewed the draft environmental impact statement and feasibility report for Flood Control, Barrett Creek sub-basin, Hennepin County, Minnesota. The environmental and public interest interests of the Service are adequately addressed in these documents and we have no further comment.

Sincerely yours,

Robert L. Giles

Robert L. Giles
Acting Regional Director





United States Department of the Interior

NATIONAL PARK SERVICE
INTERAGENCY ARCHAEOLOGICAL SERVICES-DIVISION
OFFICE OF ARCHAEOLOGY AND HISTORIC PRESERVATION
1978 NORTH GARRISON - ROOM 107
DENVER, COLORADO 80227

IN REPLY, REFER TO
B22-P1(D)

OCT 09 1975

Col. Max W. Noah
District Engineer
Corps of Engineers, St. Paul
District
1135 U.S. Post Office & Custom House
St. Paul, Minnesota 55101

Dear Col. Noah:

Thank you for providing us with a copy of the Draft Environmental Impact Statement for the Bassett Creek Watershed Flood Control, Hennepin County, Minnesota. We are pleased to note on page 16 that archeological and historical resources will be identified and evaluated prior to installation of project measures. However, we urge that your office effect coordination as soon as possible with the State Historic Preservation Officer and the State Archeologist and conduct any additional studies that may be necessary to identify and evaluate cultural resources in areas that may be affected by the proposed project.

26

(103)

The results of these studies should be included in the Final Environmental Statement for this project, which should also contain documentation of review procedures undertaken to comply with the Advisory Council on Historic Preservation's "Procedures for the Protection of Historic and Cultural Properties" (36 CFR 800). Such information should constitute one factor in the decision-making framework for this project. If as a result of such studies, it is determined that the project will unavoidably adversely affect significant cultural remains, we will be happy to discuss mitigative measures that should be implemented under the authority of the Archeological and Historical Preservation Act of 1974 (Public Law 93-291).

27

The above remarks are advisory and do not represent the official views of the National Park Service. Review of draft and final Environmental Impact Statements is still the responsibility of the appropriate Service Regional Office, in this case the Midwest Regional Office, 1709 Jackson Street, Omaha, Nebraska 68102.



Sincerely yours,
Jack R. Rudy
Jack R. Rudy
Chief, Interagency
Archeological Services - Denver

CORPS RESPONSES TO THE UNITED STATES DEPARTMENT OF THE INTERIOR - NATIONAL PARK SERVICE

26. Coordination has been initiated with the State Archeologist and the Historical Society. They have reviewed the draft environmental impact statement and their comments are included in this statement.
27. An archaeological reconnaissance has been conducted in the project area but no cultural resources were identified. The results of this reconnaissance are presented in the revised draft environmental impact statement, page 16. An intensive survey and testing program would be conducted prior to any construction to identify cultural resources in the area. If sites are identified, procedures would be followed as established under Public Law 93-291.



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Federal Building, Room 300
Dundee, Minnesota 55101

LWR

FEB

Colonel Forrest T. Gay
District Engineer
U.S. Army Engineer District
St. Paul
1135 U.S. Post Office and Custom
House
St. Paul, Minnesota 55101

Dear Colonel Gay:

This letter supplements our views of October 9, 1975, regarding the draft Feasibility Report and draft Environmental Impact Statement for the proposed Flood Control Project on Bassett Creek, Hennepin County, Minnesota. These comments are provided for technical purposes only and do not necessarily represent the views of this Service and the Department of the Interior in respect to a review of forthcoming final documents.

Our October 9, 1975 letter expresses concern regarding the proposed modification of the outlet of Medicine Lake and its subsequent effect on an existing high quality northern pike fishery. The originally proposed modification would reduce the 100-year flood level of Medicine Lake by 0.5 feet or more. Such a reduction in the 100-year flood level would help prevent flood damage now occurring around the lake. Unfortunately, the lowering of the lake during the spring flood period also would result in the loss of natural northern pike spawning areas present along the north end and southwest end of the lake. According to the Minnesota Department of Natural Resources (DNR), the lake is at near optimum condition for northern pike production and currently provides excellent

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Since then, we have met with your staff, the Bassett Creek Flood Control Commission and the Minnesota Department of Natural Resources to consider this matter. Revised and more accurate stage frequency curves for Medicine Lake were reviewed. As a result, a new proposal to modify the outlet of Medicine Lake was agreed upon which would not

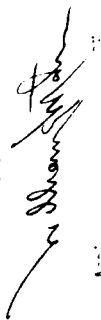


affect the current spring high water levels below the 20-year flood frequency. This would insure adequate water conditions for most years over the existing northern pike spawning areas.

If the location and design of the outlet of Medicine Lake accommodate these mutually agreed upon flood stage frequency conditions, the existing northern pike spawning areas can be adequately protected, while also reducing flood water damage resulting from the occasional 100-year flood. This modification would satisfy adequately our concerns regarding the Medicine Lake northern pike fishery. These developments should be coordinated with the Minnesota Department of Natural Resources.

We look forward to continued coordination in seeking acceptable flood damage alternatives in the Bassett Creek Watershed.

Sincerely yours,



cc: Minnesota DNR, St. Paul

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

REGION 5
18200 DULLES HIGHWAY
HOMESBORO WISCONSIN 53030
October 14, 1972



Major Norman C. Hintz
Acting District Engineer
St. Paul District, Corps of Engineers
1135 U.S. Post Office and Custom House
St. Paul, Minnesota 55101

Dear Major Hintz:

As requested we have reviewed the draft environmental statement for the proposed Flood Control Project, Bassett Creek Watershed, Hennepin County, Minnesota.

The only comment we have to offer is that the maps should be improved in the final so specific features of the proposed flood control project can be identified.

The opportunity to review and comment on the draft environmental statement is appreciated.

Sincerely,
[Signature]

William C. Hintz

Acting District Engineer

St. Paul District

4010 Highway 100, St. Paul, MN 55117

CORPS RESPONSES TO THE UNITED STATES DEPARTMENT OF TRANSPORTATION

28. Revised maps have been included.

**Advisory Council
On Historic Preservation**

1522 K Street, N.W.
Washington, D.C. 20005

October 3, 1975

Colonel Max W. Noah
Corps of Engineers
District Engineer
Department of the Army
St. Paul District
1135 U.S. Post Office & Custom House
St. Paul, Minnesota 55101

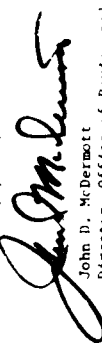
Dear Colonel Noah:

This is in response to your request of 8 September 1975 for comments on the environmental statement for the Flood Control Project, Bassett Creek Watershed, Hennepin County, Minnesota. Pursuant to our responsibilities under Section 102(2)(C) of the National Environmental Policy Act of 1969, we have determined that your feasibility study is progressing satisfactorily in compliance with our procedures (36 CFR Part 800).

In the final environmental statement, please include the results of a cultural resources reconnaissance and the comments of the Minnesota State Historic Preservation Officer in accordance with your draft procedures (33 CFR Part 305).

Thank you for your interest in Historic Preservation.

Sincerely yours,


John D. McDermott
Director, Office of Review and
Compliance

CORPS RESPONSES TO THE ADVISORY COUNCIL ON HISTORIC PRESERVATION

29. The results of the reconnaissance and comments of the State Archaeologist, Historical Society, and National Park Service are included in the revised draft statement, paragraph 2.12.

This is an advisory document and does not constitute a binding commitment of the Department of the Army. It is subject to change without notice.



• Square Building, 7th Street and Robert Street, Saint Paul, Minnesota 55101 Area 612, 227 9421

December 8, 1975

Colonel Max W. Noah
District Engineer
Corps of Engineers
Department of the Army
1135 U. S. Post Office & Custom House
St. Paul, Minnesota 55101

RE: Draft Environmental Impact Statement & Feasibility Report
Flood Control Project, Bassett Creek Watershed, Hennepin County
Metropolitan Council Referral File No. 3046

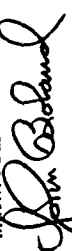
Dear Colonel Noah:

At its meeting of November 20, 1975, the Metropolitan Council considered the attached report of its Environmental and Transportation Committee on the proposed plan for flood control on Bassett Creek. The Council found the proposed plan in accord with Metropolitan development Guide policies and plans and directed the forwarding of its report to you as its official comments and recommendations.

Thank you.

Sincerely,

METROPOLITAN COUNCIL


Jim Roland
Chairman

JB:emp

Attachment

cc: Jim Scheettler, Metropolitan Council Staff

MEMPHIS
Suite 300 Memphis, Tennessee

REPORT OF THE ENGINEERING
RELATIONS

TO: Metropolitan Council

SUBJECT: Baggett Creek Flood Control
(Referral No. 101)

At its meeting of November 14, 1967, the Board of Directors of the Metropolitan Council adopted the following resolution:

The Board is hereby authorized to request the Metropolitan Council to purchase the Baggett Creek Flood Control Project and a new tunnel along the lower 1.5 miles of the Baggett Creek to replace an existing tunnel which is in need of replacement.

RECOMMENDATION:

That the Council find the proposed plan to be in accord with Metropolitan Development Guide Policies and Plans and forward the attached memorandum to the Corps of Engineers as the official recommendation of the Metropolitan Council.

Respectfully submitted,

Stanley Krutler, Chairman
Gladys Brooks
George Dooling
Alice Erbe
Todd Lofko
Marcia Bennett
Joan Campbell
Alton J. Gasper

JS/im

DATE: 10/10/75
MEMORANDUM FOR: THE HONORABLE
MEMORANDUM FOR: THE HONORABLE

November 5, 1975

MEMORANDUM

TO: Environmental and Transportation Committee
FROM: Staff (Jim Schoerler)
SUBJECT: Bassett Creek Flood Control Feasibility Report and EIS (Referral No. 1046)

I. Authority

The U. S. Army Corps of Engineers has forwarded for Metropolitan Council review a "Feasibility Report for Flood Control on Bassett Creek in Hennepin County". The report selects and describes a specific alternative for flood control. In December, 1974, the Corps of Engineers prepared a similar report which outlined more than a dozen alternatives. The chosen alternative was selected from these.

The draft Environmental Impact Statement for the project has also been submitted for Metropolitan Council review. The two reports will be considered together.

The reports are being reviewed under the Metropolitan Council's authority as an A-95 review agency (O.M.B. Circular A-95). Responses by the Council and other agencies will be considered in the preparation of the final Feasibility Report and EIS.

II. Background

Bassett Creek has a history of major flooding problems dating back to 1901. Most of these instances were due to a tunnel along the last 1.5 miles which severely restricts the hydraulic capacity of the creek. As development has spread up into the watershed, additional construction caused by street crossings have created new flood problem areas and increased development within the floodplain has resulted in increased actual and potential flood damage costs.

In 1969 the nine municipalities which have all or part of their area located within the watershed formed the Bassett Creek Flood Control Commission through adoption of a Joint Powers Agreement. The important provisions of the Joint Powers Agreement.

At the request of local interests through their representatives in Congress, the Senate and House committees on public works have adopted resolutions requesting the St. Paul District Corps of Engineers to assist in a study of the flood and related land resource problems in Bassett Creek.

In response, the Corps of Engineers directed the preparation of a "Feasibility Report for Flood Control" dated September, 1974. This report described a number of alternatives for alleviation of flood problems in the Metropolitan Council was requested to review the report and supplied comments and recommendations in January, 1975. Since the report only described alternatives and no single one was selected, the review was handled at staff level.

A second report, also titled "Feasibility Report for Flood Control", dated September, 1975, is for one more review at this time. The report identifies a specific alternative for flood control which the Corps feels most satisfactorily meets the technical and public requirements for flood control as they interpret them. The Corps identifies the report as a draft and has submitted it to a large number of agencies and organizations for review. The Corps will prepare a final report which will take into account the comments received.

Many steps remain before the proposed plan can be brought to reality under Corps of Engineers procedures.

III. Staff Review

After studying the documents submitted, staff determined that there was insufficient information to adequately review the Plan. A meeting with the Corps of Engineers staff and a representative of the Metropolitan Council working firm which prepared the reports was arranged to discuss the problems and to obtain necessary information. Staff feels that the meeting was successful and that a adequate background was obtained to support the Metropolitan Council review.

A. Development of a Policy

Water resources conflicts are contained in the 1992 Water Policy Framework, which states that "development of the Niger Delta is development for all".

Particularly relevant policies of the Protection Group Chapter are the following:

Policy 6 Natural watercourses should be identified in a storm water plan developed as part of a local comprehensive plan.

Policy 7 Natural watercourses should be preserved and managed to enable storm water runoff.

Policy 8 Subdivision regulations should require easements for natural water courses and water bodies and should make them integral parts of land development site plans.

[illegible]

Relevant policies of the Water Resources Chapter are:

Policy 12 Drainage plans should be prepared for a watershed that is a flood-prone area with all governmental units, with a technical area of responsibility.

The third central player in the development of the system is the state. However, it should be noted that the state's role in the development of a system of employment is not limited to the state's efforts to create and support the public sector, which is part of the development.

[illegible]

This policy parallels the three-pronged approach of the *Long-Range Policy Reform* to ensure that the selected plan is a good fit for the community. It is important to note that the plan selection process was not intended to be a top-down exercise. In addition to the significant role played by the advisory committee, the community features prominently in all three stages of the reform, with the focus of the selected plan.

In summary, these authors find that people who are not happy with the way the economy is doing are more likely to support a change in the government, but that this effect is moderated by the extent to which they are satisfied with the way the economy is doing. In other words, people who are not happy with the way the economy is doing are more likely to support a change in the government if they are also dissatisfied with the way the economy is doing.

B. *Agave* - 100% Agave
Blended with other spirits

The portion of the creek, *de la Torpede*, which flows into the river at the place above mentioned, is a proposed National Park, and is the only one of the kind in the State. It was reserved at the call of the President, and is now under the management of the War Department. It is situated about 10 miles from the mouth of the river, and is a beautiful spot for a summer resort.

as a recreational trail corridor and therefore is in accord with the Development Guide. However, the latter is more complicated. This section runs through a tunnel, about 1.5 miles long, that is in very poor condition and which is the major expense item in the selected plan. The plan concept is to build a new tunnel in association with the Minnesota Highway Department. The new tunnel would outlet below St. Anthony Falls, thereby providing several hydrologic benefits.

This section was included in the Regional Recreation Open Space System Plan because of a proposal by Minneapolis Mayor Al Hansen to uncover the creek and provide from 100 to 200 acres of open space along the creek bed. This project would form the nucleus of redevelopment in the area. Minneapolis is currently studying the feasibility of such a project.

The main question is whether a new diversion tunnel and a creek reopening would be an unnecessary duplication and waste of funds. Complicating the question is the urgency that something be done before a catastrophic flood results from a blockage or failure of the old conduit.

The Minneapolis proposal is estimated by the Corps of Engineers to cost approximately \$50 million, a consequential amount that because of its size reduces the possibility of the proposal being effected. Yet the urgency for some correction of the conduit problem remains.

Staff judgment is that the urgency of the conduit problem is the major consideration. In the event that a creek uncovering project is initiated at a later date, the availability of the new tunnel can significantly benefit the uncovered creek by providing flood protection and providing for the careful control of water flow through the new channel. The famous Paseo del Rio in San Antonio is successful largely because of a flood diversion scheme. The availability of the new conduit could significantly reduce the cost of a creek uncovering and redevelopment project.

Hence, we find the proposed Corps of Engineers plan to be in accord with Metropolitan Development Guide Recreation Plans.

(112)

VI. Conclusion

The selected plan is in accord with Metropolitan Development Guide Policy and Plans.

V. Recommendations

That the Environmental and Transportation Committee find the selected plan to be in accord with Metropolitan Development Guide Policies and Plans.

BR/aw

COMPS RESPONSES TO THE METROPOLITAN WASTE CONTROL COMMISSION

30. The relocation of sanitary systems due to increased stages would be done and is included as a cost in the overall flood control plan. These facilities would be relocated as appropriate. Technical aspects of possible interferences would be resolved during the detailed design stage.
31. Flood proofing is discussed in more detail in appendix 1, section I of the Feasibility Report and it is noted that clear water inflow would be pumped to a point above the flood level for discharge into the creek directly or via storm sewer facilities. See comment 72 for additional discussion of flood proofing.

November 7, 1975

District Engineer
St. Paul District, Corps. of Engineers
1135 U. S. Post Office and Custom House
St. Paul, Minnesota 55101

Re: MCSER - ER
Draft-Environmental Impact Statement Flood Control - Bassett Creek Watershed, Hennepin County, Minnesota

Gentlemen:

We have received the subject draft environmental impact statement and conducted a review in the areas of concern to the Metropolitan Waste Control Commission. In the past, the Commission's Interceptor Facilities as well as the local sanitary sewer collection system have been adversely affected by the flooding of Bassett Creek. Flooding related storm water inflow into the sanitary sewer system occurs at flooded manholes and in flooded basements. Any flood control project which provides for increased capacity of the stream channel and/or additional storm run-off detention facilities will be of benefit to the operation and maintenance of the sanitary sewer system.

The sanitary sewer collection system is being maintained by each local municipality including the maintenance of the Commission's interceptor system by contract. The local maintenance forces have in the past attempted to flood proof manholes subject to surface flooding. We note that the flood levels will be changed as a result of the flood control improvements. In certain segments of the creek the flood level will be raised. The effect upon the sanitary sewer system needs to be investigated and flood proofing measures should be incorporated into the improvement program for that portion of system subject to surface flooding. Relocation of sanitary sewers would generally seem to be impractical.

We note that a number of existing buildings will remain in the flood zone. These buildings are to be flood proofed under the recommended plan. Suggested methods for flood proofing basements recommend the installation of sumps and pumping system to discharge all water accumulations in the basement to the building sanitary sewer stack. However, discharges of clear water, other than sanitary wastewater, to the sanitary sewer system are prohibited under most local ordinances. It is, therefore, necessary to install separate systems for the conveyance of the wastewater to the sanitary sewer and the ground seepage or flood waters to surface or storm water facilities.

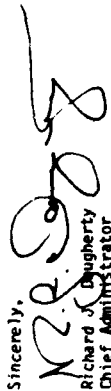
District Engineer
Page Two
November 7, 1975

CORPS RESPONSES TO THE METROPOLITAN WASTE CONTROL COMMISSION

The Metropolitan Waste Control Commission is the owner of all sanitary interceptor sewers and has direct responsibility for the operation and maintenance of these facilities. A number of interceptor facilities are located in close proximity to the proposed project improvements. The project feasibility report has not identified potential conflicts, nor is it possible from the preliminary nature of the technical information contained in the feasibility report to ascertain the location of possible conflicts between interceptors and proposed flood control improvements. We would expect that the technical aspects of possible interferences can be resolved during the detailed design stage. However, at this stage we are concerned about the method of financing the relocation, if necessary, of interceptor facilities. The provisions for cost sharing of federally supported flood control projects require that local interests will have to make the necessary relocation and/or modifications of utilities. The Commission would expect that relocation costs of interceptor facilities, if they fall into the non-federal category, be borne by the local municipalities, since they are the direct beneficiary of the flood control improvement. The Commission would not be receptive to any request for financial participation.

We appreciate the opportunity to review and comment on this project and will be available to discuss or review matters of mutual concern arising from the implementation of this project.

Sincerely,


Richard J. Dougherty
Chief Administrator

RJD:KEF:baw

12. Close coordination will be maintained throughout study. The costs of sewer and other utility alterations are included in the project as a charge to the local sponsor of the flood control project except that relocations of utilities under project structures is a Federal cost.

Minnesota Pollution Control Agency

(812) 296-7301

Colonel Max W. Noah
District Engineer
St. Paul District Corps of Engineers
1135 U.S. Post Office and Custom House
St. Paul, MN 55101

Dear Colonel Noah:

Pursuant to 40 C.F.R. Section 1500.11 of the President's Council on Environmental Quality (C.E.Q.) "Rules and Regulations for Preparation of Environmental Impact Statements: Guidelines," the statutory responsibilities of the Minnesota Pollution Control Agency (MPCA), including but not limited to those under the Minnesota State Environmental Policy Act of 1973, and Major Norman C. Hiltz's letter of August 28, 1975, the comments below are submitted in response to the Draft Environmental Impact Statement, Flood Control, Bassett Creek Watershed, Hennepin County, Minnesota, August, 1975. These comments are based on the Agency's review of the Draft EIS and the Bassett Creek Watershed Feasibility Report for Flood Control, September, 1975.

The MPCA recognizes the primary purpose of the project is to control flooding on Bassett Creek. In addition, storm water drainage from the proposed 194 freeway will be an integral part of the preferred alternative. There is concern that the project in its entirety is not considered in one EIS. We recognize the logical break in the Highway EIS and Corps EIS takes place where flood control meets the highway drainage project. Both responsibility of construction and economics change at this point. We do, however, feel that the total impact of the flood control project should be assessed in addition to the highway drainage to include effects on the Mississippi River, ground water, etc. from the combined project.

The Draft EIS is somewhat lacking in its discussion on water quality. First, there is no inventory provided for point and non-point source discharges.

CORPS COMMENTS TO THE MINNESOTA POLLUTION CONTROL AGENCY

33. The Minnesota Highway Department is currently conducting an analysis of the environmental impacts of their highway drainage project. See paragraph 4.05 of revised draft EIS and response 6.

34. An inventory of point and nonpoint discharges and an analysis of the effects of runoff from future development is beyond the scope of this study, however, the Bassett Creek Flood Control Commission has initiated an intensive stream monitoring program to identify reaches of the stream where water quality is being affected by point and nonpoint discharges. When these reaches have been isolated the Commission intends to investigate methods of eliminating or reducing the effects of point and nonpoint sources on water quality in those reaches. The Bassett Creek Flood Control Commission is also conducting studies on the effect of increased urban runoff on the creek, lakes and ponds in the watershed and is evaluating alternate methods of minimizing the effects of increased urban runoff on water quality. During advanced planning studies, bottom and stream bank sediments will be sampled to determine if they are polluted. It is intended that water quality standards not be violated by the proposed action. See also comment and response under 19.

CORPS COMMENTS TO THE MINNESOTA POLLUTION CONTROL AGENCY
(continued)

- 2 -

35. The revised FIS now discusses the effects of the project on ground water. See also response 6.
36. Flood flow velocities downstream of the proposed control structures would be reduced, however, low flow discharges would not be affected. The net assimilative capacity and natural purification capabilities of the stream would not be reduced and the net flushing rates of the lakes in the watershed would not be affected.
37. We recognize the problems associated with pollution, however, these concerns are beyond the scope of this study. Point and non-point sources of pollution are being investigated by the Bassett Creek Flood Control Commission. Aspects of the highway drainage plan are being addressed by the Highway Department.
38. See response number 9 for a description of the various regulations in effect and proposed for the watershed.

It would be important in the discussion of water quality to include the location and extent of storm sewerage and an inventory of point source discharges including the characteristics of the discharges. Second, the effects on water quality from clearing, snagging and sediment removal cannot be assessed until information is made available on whether the bottom and stream bank sediments are polluted. Third, the effects on increased future urban runoff should be discussed. Finally, there should be an assessment and a statement on what, if any, water quality standards will be violated by the action.

The Agency is concerned over the general deterioration of certain ground water supplies in the area. It is necessary to include in the FIS a discussion on the effect on ground water. The watershed, during most of the year, is a discharge area for ground water. Some during the dry periods the area would temporarily be recharged. Some discussion is necessary on how and when this occurs in connection with the environmental effects that might result from the project.

We understand that the tunnel proposed under the Corps of Engineers flood control project is closed conduit, thereby a minimum of infiltration and exfiltration would occur. It is, however, not fully disclosed what will take place downstream in the deep tunnel. The effects of draining a ground water table by infiltration or affecting the quality of ground water by exfiltration is unknown and should be discussed.

The effect of this project on hydraulics of the watershed is presently unclear. What effect will the project have on stream velocities and low flow? Will the project affect the assimilative capacity or the natural purification capabilities of the streams involved? Will the lakes have reduced or increased flushing rates? These questions are important to the overall assessment of impacts.

If the previously mentioned impacts are identified, it would then be possible to expound on the mitigating measures that can minimize the impacts.

The Agency suggests that the project include mitigating measures to control non-point source and highway drainage to a great extent.

The whole success of the flood control project lies in the planning and enforcement of the municipality on flood plain encroachment. The Agency would support the adoption of strict enforcement policies or regulations to be implemented through the watershed.

The MPAA's technical staff is available to discuss our concerns in greater detail if necessary. If you have any questions, please feel free to contact me.

Winger

Page 1, C
Executive Director

Mr. Robert W. Thompson, President, American Telephone and Telegraph Co., New York City;
Mr. Robert W. Thompson, President, U.S. Fish and Wildlife Service
Mr. George Humphreys, U.S. Fish and Wildlife Service
Barr Engineering (Leonard Kramer)
Bassett Creek Flood Control Commission
Cities of Crystal, Plymouth, Golden Valley, Minneapolis, New Hope, St. Louis Park, Minnesota
The Honorable Donald M. Fraser, 1111 Longworth House Office Bldg.
The Honorable Joseph E. Keith, 2408 Rayburn House Office Bldg.
Minnesota Highway Department



DEPARTMENT OF NATURAL RESOURCES

CENTENNIAL OFFICE BUILDING - ST. PAUL, MINNESOTA 55103

November 25, 1975

Colonel Max W. Roth, District Engineer
St. Paul District, Corps of Engineers
1135 U.S. Post Office and Curton House
St. Paul, MN 55101

Dear Colonel Roth:

NCSD-JR FEASIBILITY REPORT FOR FLOOD CONTROL AND DRAFT ENVIRONMENTAL IMPACT STATEMENT, BASSETT CREEK WATERSHED

The Department of Natural Resources has reviewed the "Feasibility Report For Flood Control" and "Draft Environmental Impact Statement" for the Bassett Creek Watershed, Hennepin County, Minnesota. This Department generally supports the selected alternative for flood control which includes the following: replacement of the existing 1.5 mile conduit outlet letting Bassett Creek to the Mississippi River, flood storage, channel works, flood proofing, and the continuation of flood plain regulations and flood insurance in the upper watershed area; provided that the mitigation measures discussed below are included.

The selected plan proposes to reduce the 100-year flood level on Medicine Lake by repairing the existing outlet weir and by modifying the channel downstream of this repaired outlet structure. There are two fisheries' problems which must be addressed with this proposed action.

First, reduction in spring high water levels of a fraction of a foot will reduce the amount of shoreline marsh areas available for northern pike spawning. To offset this loss, a minimum of 20 acres of controlled northern pike spawning area, acceptable to DNR, will have to be established in Plymouth Creek or another suitable location in Medicine Lake's immediate watershed.

Secondly, any alteration to the existing outlet should maintain, or provide, a grate similar to the one at the existing weir. This will prevent adult northern pike from leaving the lake in the spring. The repaired outlet and channel improvement proposed can be expected to create greater fish concentration problems below the dam than now exists. The proposed improvement will create free-fall conditions at the weir which will prevent returning northern pike from entering Medicine Lake.

In conjunction with the construction of the underground conduit, a fish barrier will be constructed to prevent the upstream movement of fish. The Department of Natural Resources supports the inclusion of this feature into the plan which will prevent the migration of rough fish into the watershed. This Department should be consulted for design recommendations when plans are being proposed.

RE: PROPOSED FLOOD CONTROL PLAN FOR MEDICINE LAKE

The proposed plan as presented in the revised draft EIS provides for a degree of flood protection and maintains the northern outlet of Medicine Lake. This proposal is the result of coordination and correspondence with the Minnesota Department of Natural Resources, the U.S. Fish and Wildlife Service, and the Corps of Engineers. A fish barrier will be provided on the new outlet structure. Coordination will continue with the Minnesota Department of Natural Resources concerning the type of barrier to be installed.

The proposed plan for Medicine Lake has been revised as a result of further coordination with Minnesota Department of Natural Resources. The plan is acceptable to DNR as stated in their letter of 6 February 1976. A fish barrier will be provided on the new outlet structure. Coordination will continue with the Minnesota Department of Natural Resources concerning the type of barrier to be installed.

Coordination will continue.

Colonel Max W. Noah
Page 2
November 25, 1975

CORPS RESPONSES TO THE MINNESOTA DEPARTMENT OF NATURAL RESOURCES
(Continued)

42. A fish barrier on Plymouth Creek will be further considered during post-authorization studies.
43. Clearing and snagging has been eliminated from the selected plan except for two areas. Debris would be removed from the channel in about a 0.6 mile reach between Irving Avenue North and Penn Avenue North. This material consists of tires, trash, wood bricks, etc. Vegetation to be removed would be dead and leaning trees in the primary channel with exposed root systems that are in danger of falling into the channel. About 800 feet of channel upstream of the highway 100 flood control structure would be cleared of debris and leaning trees with exposed root systems in danger of falling into the channel.
44. Coordination with your agency will be maintained. It must be recognized, however, that Corps standards for embankment designs allow for easy visual inspection and do not promote wildlife habitation, particularly for burrowing forms.
45. Appropriate corrections have been made. (See part 6, page 1-14.)
46. Appropriate corrections have been made. (See part 6, page 1-14.)

A benefit to wildlife would accrue if another fish barrier were built in the lower one mile of Plymouth Creek just before it enters Medicine Lake. Carp would be eliminated from numerous wetland areas found in the Plymouth Creek Watershed. This barrier would reduce the supply of young carp to Medicine Lake and improve production of native wildlife associated with the wetland environment in the watershed. Northern pike would be provided access to the watershed by means of a temporary operated fishway or by moving them over the barrier. This would be a desirable feature which should be incorporated into the selected plan if at all possible.

The removal of natural obstructions (stumps, brush, logs, rock, vegetation and its by-products) in and along the stream will significantly alter or destroy fish and wildlife habitat. The use and interpretation of the adjective "excessive" used to describe this debris is questioned. What criteria will be used to determine the amount of this "natural debris" to be removed from Bassett Creek? Removal of trees with partially exposed root systems and snags will eliminate habitat for fishes and other aquatic organisms. The need for removal of "stands of extremely dense brush" is also questioned. The species and numbers of fish and wildlife inhabiting the stream sections to be snagged and cleared should also be determined.

In the stream section from Dresden Lane to upstream of T.H. #100, the re-landscaping of the north end of Rice Lake storage area should include plans for the planting and seeding of vegetation which encourages residence and other use of the area by wildlife. Planting should provide food and cover for wildlife. It is best to contact regional staff wildlife expertise in regard to planting recommendations. These recommendations should also apply to the landscaping of all earthen embankments to be constructed in the flood control project. Visual barriers should also be planted with vegetation which encourages wildlife as well as enhancement of the aesthetic qualities of the natural stream setting.

COMMENTS ON DRAFT EIS:

1. Section 1.04
The last sentence of this section is incorrect and should read as follows:

"The selected plan has average annual benefits of \$1,033,000, average annual costs of \$43,000, and a benefit cost ratio of 1.90 to 1."

2. Section 2.44

This section is only partially correct. The total value of tangible flood losses will increase in the future, as stated, but not for all of the reasons given. It should be noted that future urban renewal programs and continued residential, industrial and commercial development in the flood plain are subject to flood plain regulations which require flood protection to the 100-year flood level. Furthermore, future improvements and structural replacements are also permitted under flood

plain regulations which require them to be protected against flooding. Therefore, new development in the flood plain and structural alterations and replacements of existing structures would have a minimal contribution to future flood losses.

The first sentence on page 20 should be re-punctuated. As presently written, it could be interpreted two different ways which cause confusion.

3. Section 4.33

This section is only partially correct. It is true that flood plain zoning regulations restrict alterations and extensive repairs to existing non-conforming uses within the regulatory floodway but the overall impacts are not as significant as they have been stated. Normal maintenance and repairs are permitted for all existing flood plain structures and existing structures in the flood fringe could be extensively repaired or altered, if protected to the 100-year flood elevation. Also, existing structures in the flood plain, and future structures in the flood fringe when protected to the 100-year flood elevation, are eligible for federal or federally subsidized financing with the purchase of a flood insurance policy.

4. Section 4.35

This section on flood insurance is inaccurate and is lacking detail. We would suggest this section to be revised considering the following information.

The National Flood Insurance Program is separated into two phases: the emergency phase and the regular phase. Under the emergency phase of the program, insurance premiums are heavily subsidized by the federal government. Coverage for new or existing structures is available up to \$35,000 for single unit residential structures (\$10,000 for contents) and \$100,000 for non-residential structures (\$100,000 for contents).

Once a detailed engineering study is completed which establishes the severity of the flooding threat within a community, the community is converted to the regular phase of the program. Rates for new structures are no longer subsidized and are referred to as "Actuarial Rates" and the level of coverage is double that of the emergency program. New structures within the flood plain must be insured at actuarial rates but owners of existing structures may purchase the first phase of the total coverage at subsidized or actuarial rates, whichever are lower.

5. Section 4.45 and 4.49 - "Human Aspects"

Within these two sections, there is reference to evacuation of three homes as well as evacuation of four homes. From these statements, it is difficult to ascertain if the evacuation associated with the project would be three or four homes. These statements should be clarified.

Appropriate corrections have been made. (See paragraphs 4.30 and 4.31)

4. The first sentence on page 20 should be re-punctuated. As presently written, it could be interpreted two different ways which cause confusion.
5. The National Flood Insurance Program is separated into two phases: the emergency phase and the regular phase. Under the emergency phase of the program, insurance premiums are heavily subsidized by the federal government. Coverage for new or existing structures is available up to \$35,000 for single unit residential structures (\$10,000 for contents) and \$100,000 for non-residential structures (\$100,000 for contents).
6. Once a detailed engineering study is completed which establishes the severity of the flooding threat within a community, the community is converted to the regular phase of the program. Rates for new structures are no longer subsidized and are referred to as "Actuarial Rates" and the level of coverage is double that of the emergency program. New structures within the flood plain must be insured at actuarial rates but owners of existing structures may purchase the first phase of the total coverage at subsidized or actuarial rates, whichever are lower.
7. Within these two sections, there is reference to evacuation of three homes as well as evacuation of four homes. From these statements, it is difficult to ascertain if the evacuation associated with the project would be three or four homes. These statements should be clarified.

Colonel Max W. Moth
Page 4
November 25, 1975

CORPS RESPONSES TO THE MINNESOTA DEPARTMENT OF NATURAL RESOURCES
(continued)

6. Section 4.51 - "Economic Aspects"

The benefit/cost ratio of 1.90, as stated, includes annual recreation and advance replacement benefits which have not been documented in this section. Annual recreation benefits amount to \$28,500 and advance replacement benefits are \$150,000 annually. Including the \$855,000 reduction in annual average flood damages, gives a total annual project benefit of \$1,033,500. The total annual project costs are 543,000 and the resultant benefit/cost ratio is 1.90.

51

"DRAFT FEASIBILITY REPORT FOR FLOOD CONTROL"

52

1. Pages 96-97 - "Division of Plan Responsibilities"

An additional responsibility of the local sponsor is to acquire all the necessary permits from the State of Minnesota.

2. Page C-4 - "Future Flood Damages"

This statement is basically the statement contained in Section 2.44 of the Draft FIS. It is incorrect and should reflect those corrections referenced earlier in this letter.

3. Page D-2 -

The footnote on the bottom of this page is incorrect.

Minnesota communities are required to adopt and enforce flood plain management regulations within six months after notification by the Commissioner of the Department of Natural Resources that sufficient technical data are available to do so. Also, the current federal requirement for a community to join the National Flood Insurance Program is as follows: a community must join the National Flood Insurance Program by July 1, 1975, or one year after it has officially been designated as flood prone, whichever is later.

4. Pages D-7-D-10 "To Action-Maintain Base Condition"

The status of watershed communities which have adopted flood plain regulations and have joined the National Flood Insurance Program should be updated. As of this date all communities within the watershed have adopted flood plain zoning ordinances except Plymouth and Crystal which are in the process of doing so. Medicine Lake is the only watershed community not enrolled in the flood insurance program and is not presently required to do so by federal or state legislation.

5. Page H-20 - "Hydraulics of Selected Plan"

(a) The following sentence is ambiguous:

"Channels would be designed for easy maintenance, stable side slopes and adequate freeboard." What specifically is adequate freeboard? This should be stated.

51. Appropriate corrections have been made (see paragraph 4.61)

52. Appropriate responses to the Feasibility Report comments are in that document. See paragraph 4.62.

Colonel Max W. Noah
Page 5
November 25, 1975

CORPS RESPONSES TO THE MINNESOTA DEPARTMENT OF NATURAL RESOURCES

(b) Page H-21

It is stated that the proposed floodwall on the leftbank of the channel downstream of Glenwood Avenue would not be built to the standard project flood elevation because a flow split would occur upstream of the floodwall. We request additional information pertaining to this.

With the proposed project, at what elevation would this flow split occur? Would the flow split occur at an elevation below the standard project flood and above the elevation of the proposed floodwall? Our primary concern is: would the floodwall be overtopped before the channel split occurs upstream?

6. Page 1-12

The first paragraph on this page should be updated. Minneapolis and Medicine Lake have recently adopted flood plain zoning ordinances.

7. Page 1-17

The National Flood Insurance Act should be referenced as the "National Flood Insurance Act of 1968 (PL 90-448) as amended" and not the "National Flood Insurance Act of 1976".

8. Page 1-18

The first sentence of the first full paragraph should be changed because New Hope is now presently enrolled in the flood insurance program. Also the last sentence of the following paragraph should be written as follows:

"After June 30, 1975, or one year after a community's initial notification of being flood prone, no loans will be approved in designated special flood hazard areas unless a flood insurance policy is purchased."

The Department of Natural Resources recognizes the necessity of providing flood protection to the residents and industry located in the Bassett Creek Watershed. We note that the lack of planning on the part of municipalities in the upper portions of the watershed where the problems originate now require that flood protection works be constructed in the lower portion of the Bassett Creek Watershed.

In conclusion, the mitigation which will be required for the loss of northern pike spawning areas within the Medicine Lake area should be coordinated with the DNR Metropolitan Area regional staff. The DNR Metropolitan regional office is located at 1200 Warner Road, St. Paul, MN, (612) 296-7523.

Sincerely,

Gene H. Hollenstein
Acting Director

TLC:ch
cc: DNR members
Division Directors
Regional Administrator, Region 6
Attn: Regional Hydrologist

53. Concur. Also, some of these flood problems are the result of construction in the floodplain of the lower watershed. Floodplain regulations would eliminate future flood damages.

54. See response number 19.



DEPARTMENT OF NATURAL RESOURCES

February 6, 1976

12210 RST
St. Paul, Minn.

Mr. Robert Stenford
St. Paul District Corps of Engineers
1129 N. 3rd Street and Capitol House
St. Paul, Minnesota 55103

Dear Mr. Stenford:

Based on meetings held in your office on November 14th, and December 18th, 1975, plus subsequent information received regarding the Medicine Lake portion of the Medicine Creek sub-area, I feel our department's position on the matter of protecting watersheds can be summarized. The original proposal was to offset loss of fish and wildlife spawning areas by constructing new spawning areas in the lake's immediate watershed. At our December 18, 1975, meeting it was decided that outlet structure design alternatives would be investigated to determine if extreme highwater levels could be reduced without reducing lower stage frequencies. Rating curves developed by Barr Engineering on January 28, 1976, were reviewed with Ron Harbeck, and we feel if those water levels up to the design frequency (839.25) are not reduced from normal, northern lake population will be unaffected.

If the project is approved in Washington and more advance planning indicates it is not feasible to design an adequate outlet structure, we will again have to consider mitigation.

Also, if the project meets approval in Washington I would appreciate further consideration of a fish barrier on Medicine Creek during the more advanced planning stages.

Yours truly,

William M. Skalen

James E. Anderson
Regional Fisheries Supervisor

cc: Donald M. Carlson, Metro Region Administrator
Jerome H. Kuchta, Planning Administrator
Ronald G. Harbeck, Metro Region Hydrologist
Donald Peterson, Fish Management Supervisor
Leonard Bremer, Fish Management Supervisor

ADMINISTRATIVE SERVICES : WATER, SOILS AND MINERALS : LANDS AND LAKE
GAME AND FISH : PARKS AND RECREATION : FISH MANAGEMENT AND FISHERIES



STATE OF MINNESOTA
DEPARTMENT OF HIGHWAYS
ST. PAUL, MINN. 55155

October 30, 1975

Box J. Noah, Colonel
U.S. Army Corps of Engineers
Department of the Army
1135-U.S. Post Office & Custom House
Saint Paul, Minnesota 55101

In reply refer to: 700
Draft Environmental Impact Statement
Bassett Creek Watershed
Hennepin County, Minnesota

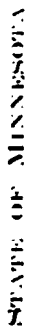
Dear Colonel Noah:

The above referenced Draft Environmental Impact Statement has been circulated throughout our Department. We consider the statement adequate and have no substantive comments to make at this time.

We will, however, be submitting comments separately on the Draft Feasibility Report. Thank you for affording us this opportunity for review.

Sincerely,

Frank D. Harristell
Frank D. Harristell
Commissioner of Highways



THEORY OF THE EARTH

STATE PLANNING AGENCY
100 CAPITOL SQUARE BUILDING
550 CEDAR STREET
ST. PAUL 55101

November 5, 1976,

Colonel Max. W. Noah
District Engineer
U.S. Army Corps of Engineers
St. Paul District
1135 U.S. Post Office
St. Paul, MN 55101

RE: Draft EIS for Flood Control Projects, Bassett Creek Watershed,
Hennepin County, Minnesota NPS/D-LE

Dear Colonel Noah:

We have reviewed the Draft Environmental Impact Statement for the proposed flood control projects for the Bassett Creek watershed District, Hennepin County, Minnesota.

We are pleased to see that several non-structural elements, particularly floodplain zoning, have been included in the chosen alternative, for we feel that long-term and short-term environmental impacts are less severe when appropriate non-structural elements are used. Further it is apparent that a program of floodplain zoning is essential to regulate floodplain development and thus minimize future flood damage.

However, there appears to be inadequate consideration of alternative locations and types of projects designed to increase flood storage capacity. The flood storage projects chosen involve three areas of channel modification and two major areas of dredging. Since these types of structural improvements have drastic effects on the existing natural environment and result in greatly increased erosion, turbidity and sedimentation, short-term decrease in biological diversity and aesthetics and long-term changes in aesthetics and types of biological systems present at the site, use of such methods should be avoided if possible. Indeed, these drawbacks to channelization are pointed out in paragraphs 6.42 and 6.43.

In addition, we offer the following comments:
Transportation. The chosen alternative involves the raising or other disruption of at least nine streets and the removal of two road crossings. Paragraphs 4.47 and 4.48 indicate that alternate traffic routes exist, although they do not show the anticipated degree of increased congestion on the alternate routes and amount of access to commercial and industrial properties that will be disrupted.

DATE - 14 OCT 1971

CORPS RESPONSES TO THE MINNESOTA STATE PLANNING BOARD

Since the various laws, regulations, etc., governing fire, marine, regulation, and flood insurance have been enacted, the measures have been a part of essentially all Corps projects (since they all have some residual floodplain). The difference here is that the area of application is more extensive and so involves the majority of projects. One of the prime factors in the fire insurance business was that no structural works were considered suitable.

504. Several alternatives for the damage reduction were considered, and of these are described in the alternatives section. The selected plan is the one that minimizes the damage suffered by the *abba* alternative.

[illegible]

11-5-75

CORPS RESPONSES TO THE MINNESOTA STATE PLANNING AGENCY

Erosion. Due to the numerous construction projects, channel modification proposals and dredging proposals, erosion will be a severe problem. We hope that the erosion prevention measures (rip rap, ground cover planting, etc.) described in the Draft EIS will be followed to minimize adverse effects; spacing the construction over several years would also reduce turbidity and sedimentation problems.

Dredging. Two major dredging projects are proposed, raising the question of disposition of dredge spoils. The Draft EIS states that this problem will be studied later. We emphasize that proper disposition of dredge spoils is necessary.

Aesthetics. Concern with aesthetics is evident throughout the Draft EIS. Although we are unsure about the effectiveness of landscaping, etc. to make the embankments aesthetically pleasing, other planned efforts will apparently minimize adverse visual impacts. Replacement of flood-damaged trees slated to be removed should also be studied. Of course, the visual impact of the landscaped project areas will be different than the visual impact of the natural site.

Table 3. Paragraph 2.44 states that "vacant land in the floodplain will probably be used for recreational purposes in the future instead of commercial and residential developments." This contradicts Table 3, which indicates that in the 100 year floodplain, residential use will increase from 570 to 700 acres, commercial industrial use will increase from 235 to 315 acres, and parks-open space will increase only from 540 to 550 acres. (Table 3 was based on existing municipal land use plans.)

We are studying the project to see if it fits into the purview of the Minnesota Environmental Impact Statement program. We will contact you later regarding this.

Sincerely,

Nancy I. Onkka

Nancy I. Onkka
Environmental Planner

NTO/dh

57. In the long term, riprapping and the replanting and sodding of disturbed areas would reduce erosion and turbidity problems. However, during construction and for a period afterwards, until the system stabilizes, there would be an increase in erosion, sedimentation, turbidity, and similar functions. The length of time required for construction has not been determined at this time.

58. Concur.

59. Planting of trees and sodding would be conducted at structural features and access areas to reduce the long-term impacts of the project. A landscape design plan will be developed during post-authorization studies that would replace removed trees and provide environmental enhancement features. No trees would be planted on structural features.

60. Table 1 is correct according to existing municipal land use plans. However it may be possible for vacant land in the watershed to remain open space instead of being developed. This is due to the floodplain regulations now being considered in the watershed. Therefore, future use of vacant land could go either way, remain open space or be developed in compliance with floodplain regulations. Paragraph 2.44 has been clarified to indicate this is a possibility.



HENNEPIN COUNTY PARK RESERVE DISTRICT
ROUTE 1, BOX 33 • MAPLE PLAIN, MINNESOTA 55453 • TELEPHONE 478-4093

January 11, 1976

CORPS COMMENTS TO THE HENNEPIN COUNTY PARK RESERVE DISTRICT

61. This information has been noted, see paragraphs 1.33 and 4.27. It should be noted that the project plan involving Medicine Lake flood levels has been revised due to adverse impacts to the northern pike fishery. See responses 7 and 9).

62. This has been clarified, see paragraph 2.41 of the revised draft EIS.

Memorandum

TO: District Engineer
St. Paul District, Corps of Engineers
1135 U. S. Post Office
St. Paul, MN 55101

FROM: C. E. French, Superintendent
Hennepin County Park Reserve District

BY: J. G. Mauritz, Director
Department of Interpretive Services

SUBJ: Draft Environmental Statement for Bassett Creek Watershed Flood Control

Little or no adverse impact seems likely from the proposed action as far as properties of interest to the Hennepin County Park Reserve District. It is unfortunate in this case, as in many others in the past, that public funds are being spent to protect poorly invested private and public funds of the past. This program is designed to correct problems that should never have been allowed to occur in the first place. Hopefully, enforcement of current environmental law will aid in preventing similar future problems.

A couple of specific points appear to affect the District in a minor way.

61. A. The lowering by a .5 feet of the surface of Medicine Lake will affect the District inasmuch as recent District purchase will result in a regional recreational park on Medicine Lake. The effect is minimal and does not appear of negative impact at this time.

62. B. Some misleading language occurs on Page 17, 2.36, stating that the District proposes a "Park Reserve on Medicine Lake. This is incorrect inasmuch as the facility to be developed will not accord with Metropolitan Council's accepted definition

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CORPS RESPONSES TO THE HENNEPIN COUNTY PARK RESERVE DISTRICT

District Engineer
Memo - 2
January 8, 1976

for park reserve but will rather be a, "Regional Recreation Park."

Inconsistencies appear to be present between the statement on Page 26, 3.02, indicating only developments already in the flood plain have been considered for protection, whereas Table 3 on Page 23 shows a "future" increase of 25 percent in residential land use and a 34 percent increase in commercial industrial land use, both within the 100-year flood plain. The upshot of this is that all but 10 acres of the 280 present undeveloped acres in the 100-year flood plain will become either residential or commercial industrial in use. This acreage represents 10 percent of the acreage of the entire 100-year flood plain. The amount of development intended appears large.

63

To summarize, the District sees no immediate adverse impact from the proposed action to which it must take opposition. It is probable that the flood control plan is the best present solution to the problems encountered. This unfortunate situation should not have been allowed but is present and appears to warrant remedy.

JM:af
cc D. K. Weaver
J. Sunde

Attachment

63. Floodplain regulations do not prohibit developments but do regulate floodplain uses. Uses are not permitted in the floodway to the extent that they require structures, fill, storage of materials or equipment, and provided they do not adversely affect the efficiency or unduly restrict the capacity of the channels or floodways of any tributary to the main stream drainage ditch, or other drainage facility or system. Future residential and commercial developments in the floodplain and improvements to existing floodplain developments are also permitted if they are protected against the 100-year flood. Therefore, these structures would have minimal contributions to future flood losses. See paragraph 2.19 of the revised draft statement and letter of comment from the Minnesota Department of Natural Resources. For additional information on floodplain regulations see response number 9. See also response 60 and responses to attorney for Wallace E. Freeman and General Mills Inc., letters of comment.

City of Golden Valley

October 23, 1975

Max W. Noah
Colonel, Corps of Engineers
District Engineer

Dear Colonel Noah:

The Council of Golden Valley made a presentation at the public hearing on Bassett Creek Flood Control Commission proposed draft E.I.S. on October 15, 1975 at the Robbinsdale Senior High School. We would like the following comments added in response to the draft E.I.S. as submitted by the Flood Control Commission. Some of the changes suggested refer to the selected plan as well as the E.I.S.

1. The plan proposes to raise the evaluation of a number of streets in Golden Valley to provide access to the abutting properties during severe flooding. The overall effect to the area, however, could be to create drainage and utility problems at times of only small rains. Our recommendation is to eliminate the proposal to raise existing streets in Golden Valley.

2. The report refers to a number of areas where clearing and snagging along the creek and in the flood plain is recommended. The E.I.S. should clearly define the clearing and snagging operation as it relates to existing growth along the creek. Also some explanation should be made of the area to be cleared in the "Flood Plain". Perhaps a typical cross-section of the creek showing the dimensions from the creek bank to the edge of the area designated for clearing would clarify this procedure.

3. Several areas along the creek are to be ringed for erosion control. The use of material to be used at each location should be spelled out in the report. Also, the report or E.I.S. should consider areas along the creek that are already creating severe erosion problems, and are not included in any creek improvement proposals under the selected plan.

The proposed road raises have been included in the selected plan to assure that areas would not be isolated by floodwaters creating public health and safety hazards in terms of supplying emergency medical, fire and law enforcement services. The costs of the road raises are included in the plan as a non-Federal responsibility. Accordingly, if the city sees no need for the road raises they could be eliminated. However, such a decision would not preclude the possibility of further investigating the road raises during the later more advanced planning phase. The final plan would not include any road raise that would cause drainage problems unless such problems could be adequately mitigated.

64. Snagging and clearing has been eliminated from the selected plan except for about a 0.6 mile reach between Irving Avenue North and Penn Avenue and for an 800-foot reach upstream of the Highway 100 flood control structure. The area at Irving Avenue North would be cleared of man-made debris such as tires, bricks, and other demolition debris. In both reaches the vegetation to be removed would be trees in the primary channel that are dead or leaning with exposed root systems and are in eminent danger of falling into the channel. In-channel debris would also be removed. Clearing and snagging has been deleted from the proposed plan for the area between Bassett Creek Drive and Highway 100. See response 65 below.

Since the proposed flood control plan is 3 to 5 years away from implementation, it is not possible at this stage in the planning process to identify those trees to be removed because the need for removal of trees depends on the species, degree and type of root exposure, and size and general condition of the individual tree. Therefore, it is expected that the situation in 3 to 5 years would differ somewhat from the existing situation. At the appropriate time during advanced design studies, those trees requiring removal would be identified on the basis of species, degree and type of root exposure, size and general condition and location of the individual tree.

Snagging in the creek consists of the removal of that natural and man-made debris in the floodway that impedes the flow of floodwaters causing increased flood levels. The extent of debris removal would be determined during advanced detailed design studies based on the extent to which this debris exists at that time. Control of the snagging operation would depend on the type and extent of debris requiring removal. The floodway of the creek is that portion of the channel which is required to convey flood flows and varies with discharge, channel slope, and channel cross-section. A section illustrating the floodway concept is shown on plate 1-1 of the feasibility report.

CORPS RESPONSES TO THE CITY OF GOLDEN VALLEY (cont)

65. Riprap would consist of either field or quarry stone and would be placed at the outlets of the proposed control structures to prevent erosion and failure of the structure. Generally the riprap would be placed 25 feet and 50 feet upstream and downstream, respectively, of structures. There are various areas along the creek that have severe erosion problems. Consistent with the current policy, erosion protection measures in other areas of the creek are considered to be a local responsibility since they cannot be justified economically nor can they be justified on the basis of threat to public health or safety. Thus, erosion protection measures in other areas of the creek have not been included in the recommended plan.

66. If during advanced planning studies it is determined that any of the proposed structures are susceptible to plugging because of debris accumulation, they would be equipped with trash racks. Each of the proposed structures would have overflow weirs which would not be susceptible to plugging or blockage and the weirs would be capable of passing design flows without significant increases in upstream water surface elevation.

Maintenance which would be the responsibility of local interests and would include periodic inspections of the various flood control structures, necessary repairs or replacements, removal of debris accumulations and clearing and snagging in critical reaches when necessary. Project design would attempt to minimize maintenance requirements.

Failure of any of the control structures during the design storm would increase downstream flood levels to approximately the existing flood profile because channel crossings downstream of each of the structures would restrict flows. Catastrophic flooding and loss of life would not be associated with failure of the structures because of the relatively small volumes of water impounded.

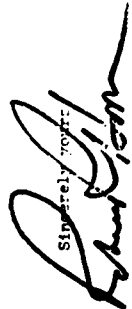
67. Upon completion of project construction, the maintenance of the flood control project would be the responsibility of local governmental unit(s) acting as the local sponsor(s). Reference local cooperation requirements presented on pages 96 and 97 of the summary feasibility report. The matter of maintenance responsibility and cost allocation to the communities in the watershed must ultimately be resolved by the communities.

h. The report refers to a number of flood control structures to be constructed in the area at various locations. Whether the report for the E.I.S. has considered problems that will arise in the future with maintenance of the creek and the structures themselves. The E.I.S. should consider the effect on the adjacent land if the structure becomes plumed or blocked or if the structure fails during periods of extremely high water.

5. The last item that is a concern of the City is a policy decision that must be made by the Commission. The responsibility for maintenance along the creek after the initial improvements are made under the selected plan should be determined by the Commission. A decision should also be made concerning the sharing of costs for the maintenance in the creek.

We have attached the following for your records.

1. Statement made on behalf of the Golden Valley Village Council at the public hearing.
2. Letters from the Environmental Commission on review of the plan and E.I.S.
3. The report follows the Environmental Commissions on review of the plan and E.I.S.

Sincerely,

 Dr. Robert Hoover
 Mayor

CORPS RESPONSES TO COMMENTS OF THE VILLAGE OF GOLDEN VALLEY AT THE PUBLIC HEARING

68. The area to be cleared and snagged has been modified as discussed previously. (See response number 64.) The terms have been clarified (see paragraph 1.1f and 1.2g).

69. The Briarwood Bird Sanctuary has been recognized in the revised draft FIS. This area would be preserved. Clearing and snagging is no longer a part of the proposed plan for this area. See paragraph 2.23 of the revised draft FIS.

70. See response number 63.

71. See response number 64.

See response number 64.

Public meetings will again be held during postauthorization studies.

Village of Golden Valley

PRESENTATION BY
COUNCILMEMBER THORSEN
AT THE BCFC AND
CORPS OF ENGINEERS
PUBLIC HEARING
10-15-75

The Golden Valley Council recognizes the need for flood control measures on Bassett Creek. We support the efforts of the Bassett Creek Flood Control Commission to formulate a plan for such measures. We feel that public participation is vital to this effort. We support the process of public workshops followed by response from the consultant engineers and the Corps of Engineers. In working for the best solution to the problem, we feel the following steps must be taken.

1. A thorough study necessary to prepare an adequate environmental impact statement. We are forwarding the report of our Environmental Commission which details the need for this study.
2. Modification of the proposed plan to ensure protection of the creek bed and flood plain against extensive clearing and snagging of natural growth; inclusion in the plan of definitions of "clearing and snagging" and "riparian."
3. Recognition of Briarwood Bird Sanctuary as a dedicated wild life area; careful attention to the area in the Environmental Impact Statement and changes in the plan to consider no physical modifications.
4. Further study of the advisability of raising municipal streets and of the effects such raising would have on abutting properties.
5. A continued or additional public hearing to give the public and agencies concerned a chance to respond to the draft.
6. The Bassett Creek Flood Control Commission should delay approval of the proposed plan until the above steps have been completed.

We raise these points for three reasons: (1) The Environmental Impact Statement is inadequate and therefore cannot be properly evaluated and commented on by citizens and agencies. (2) This inadequacy may cause the project to be delayed by some higher governmental agency or the courts. (3) It is necessary at this time to incorporate the modifications we advise before we can approve the plan. We are forwarding details worked out with our city engineer regarding steps two and four above.

It has been a long and difficult process to reach this point. We feel a good plan is emerging. We must take care to continue the responsible and responsive planning procedures followed up to this point.

men

Civic Center 7800 Golden Valley Rd. Golden Valley, Minnesota 55427 (612) 545-3781

72. Flood proofing is a combination of structural changes and adjustments to properties subject to flooding, primarily meant to reduce or eliminate flood damages. Although more simply and economically applied to new construction, flood proofing is also applicable to existing facilities. It has promise in one or more of the following situations:

- Where moderate flooding with low stage, low velocity and short duration is experienced.
- Where the traditional type of flood protection is not feasible.
- Where individuals desire to solve their flood problems without collective action, or where collective action is not possible.
- Where activities dependent on stream locations need some degree of protection.
- Where a resource manager desires a higher degree of protection than that provided by a flood control project.

Many different flood proofing measures have been recognized and studied. The names given most of them are self-explanatory. Included in these measures are the following items:

Seepage control	Watertight caps	Appliance protection
Sewer adjustment	Proper anchorage	Utility adjustments
Permanent closure	Underpinning	Roadbed protection
Openings protected	Timber treatment	Elevation or raising
Interiors protected	Deliberate flooding	Temporary removal
Protective coverings	Structural design	Rescheduling
Fire protection	Reorganized use	Proper salvage

The following paragraphs describe some of the more applicable measures available for flood proofing existing residential properties.

Because of previous foundation soils and high ground water table in some areas of Bassett Creek, seepage control would remain a problem even with the proposed flood control works in place. However, foundation walls could be made water-tight to minimize water infiltration through cracks and crevices in the walls. In buildings under construction, this could be accomplished through use of waterproof membranes and seals. Construction joints could be protected by use of a neoprene or similar waterstop. Existing masonry or stone foundations are more difficult to waterproof, particularly if the mortar joints have deteriorated with age. Sealing of walls to prevent seepage could be accomplished in many cases, however, by coating them, preferably on the exterior, with hydraulic cement, epoxy paint, or other similar water-proofing materials. However, sealing and waterproofing walls increase the hydraulic forces acting on the walls, unless drainage provided by cracks and crevices prior to sealing is provided by other means. Sometimes the wisest course is to permit seepage through the wall and then control it by a floor drain and sump pump. Existing cracks and leaks in walls

City of Golden Valley

October 1, 1975

MEMO TO: Mayor and City Council

FROM: Wallace Klevsdal, Chairman of Golden Valley Environmental Commission

SUBJECT: Review of Bassett Creek Flood Control Plan and E.I.S.

The Environmental Commission has reviewed the Plan and the E.I.S. and will provide our detailed comments with background information at the special meeting of the Council with Ed Silberman on October 1, 1975. We realize this will give you no opportunity to review the comments prior to the special meeting, but we will be present to discuss any points which you may wish to discuss.

We feel that there are changes which are necessary to the Plan and to the E.I.S. which I will list and which are discussed in our comments:

1. Assurances and detailed information for residents whose homes are to be flood proofed.

provide the most practical form of drainage to relieve pressure, and in some cases, this drainage could be supplemented by drilling holes through the walls. Structural and hydraulic analyses of alternative designs and associated cost estimates would enable the designer to choose the most suitable means of controlling seepage at a given building. A sump and pump system could be employed to help protect the subsurface part of a building. The pump could be designed to accept storm and seepage flows and pump them to a point above the flood waters. The sump should be open to the soil at the bottom and to atmospheric pressure at the top within the basement. This would provide a fail-safe feature, in that power or pump failure would allow water to flood the basement and balance the outside flood-induced pressures upon the basement walls and floor slab. As an alternative, a prearranged program of deliberate flooding with clean water could be employed to minimize the cost of cleanup after a flood.

Most existing subdrains, whether connected to sewage systems or not, are subject to backflow and high pressures during floods. Since these high pressures could burst the usually encountered clay pipe subdrains and endanger basement walls and floors, some device, such as a gate valve, must be provided for protecting or isolating subdrains around buildings from these high pressures. There are several alternative methods for controlling backflow through sewers. One method would be to install a main valve where the sewer is strong enough to resist flood-induced pressure and where all possible reverse flows can be stopped. This valve should be designed to accommodate grit and other materials which could lodge in it. If the pipe is of sufficient strength, an alternative would be to install separate valves on all basement fixtures and floor drains. These valves could be inflatable rubber plugs or a similar type of mechanically expandable rubber plug. Valves designed for low pressure (20 pounds per square inch and less) could be installed in drain lines of fixtures which are below design water levels. In either of the above alternatives, it would be necessary to provide adequate sump pumps to handle any leakage. Another alternative for controlling sewer back-up provides for outletting all floor drainage, appliance drainage, drain tile flow, and any seepage that might enter the building to a sump pump. The pump would lift the drainage to an elevation above the design flood on a permanent basis. By thus eliminating all gravity sewer drains, the problem of flooding backflow could be eliminated and a subsurface area permitted to function during floods.

A useful guide, "Introduction to Flood Proofing," prepared by the Center for Urban Studies, University of Chicago, under the sponsorship of the Corps of Engineers, is available upon request. It presents many helpful suggestions and briefly outlines and illustrates the possibilities of this approach. Another guide, "Flood Proofing Regulations," prepared by the Corps of Engineers, is also available upon request.

CITY OF GOLDEN VALLEY (GOLDEN VALLEY ENVIRONMENTAL COMMISSION)
LETTER OF 1 OCTOBER 1975 (continued)

CORPS RESPONSES TO THE CITY OF GOLDEN VALLEY (GOLDEN VALLEY ENVIRONMENTAL COMMISSION)

73. See response number 64. Changes to the Briarwood Bird Sanctuary are no longer a part of the proposed plan.
74. See response 64 for a description of proposed snagging and clearing.
75. The revised draft has been expanded. Also see response numbers 64, and 65.

2. Changes to the Flood Control Plan to eliminate physical changes to the Briarwood Bird Sanctuary.
73. Changes to the Plan to provide definition of which trees are to be removed and change to the E.I.S. to detail the effect.
74. Changes to the Plan to better describe the term "snagging" in the Plan and control over this operation. Also, the E.I.S. should address the impact of this action.
75. The E.I.S. should be revised to address the effect of channel crossing construction, rip-rapping, and road bed raises.

We feel that flood control action is required and that the changes to the original proposed plans have been significant and positive. We also would like to thank Ed Silberman for his cooperation and willing attitude to work for agreeable solutions.

HK/ko

Civic Center, 7800 Golden Valley Rd., Golden Valley, Minnesota 55427. (612) 545-3761

ENVIRONMENTAL IMPACT ASSESSMENT - Bassett Creek Study

SU : It appears that the National Environmental Policy Act is receiving casual treatment from the Corps of Engineers in this instance. In view of fact that flood control measures are definitely necessary to protect Co. Valley residents, it is unfortunate that the Environmental Impact Statement (E) has given such cursory treatment. The G.V. Environmental Commission cannot proceed with any phase of the proposed project until the Statement is drafted to offer a more precise assessment of project impacts. No project activities should be undertaken until the issues we have addressed in the following comments have been resolved, and residents have an opportunity for full review of the drafted statement. We also suggest that no "hold harmless" agreement is entered into with the Corps until we have more information on environmental impacts.

ANALYSIS

The G.V. Environmental Commission has reviewed the EIS for the Bassett Creek Flood Control Plan, and has found it to be totally inadequate. The Statement appears to be no more than a reorganization of the previous feasibility report and makes no attempt at serious environmental assessment. It appears that the EIS was prepared as a justification for the project, rather than a vehicle by which to examine various environmental alternatives and consequences. The report fails to recognize the most basic ecological principle that an action in one part of the system will yield a reaction in another part of that system.

We believe that the Bassett Creek Flood Control Plan must not be approved until the EIS is rewritten to evaluate the true environmental impact of the project. This would require a new public hearing with full opportunity to review the rewritten EIS.

Section 102 of the National Environmental Policy Act requires that:

- "...to the fullest extent possible...all agencies of the Federal Government shall (C) include for all major Federal actions significantly affecting the quality of the human environment, a detailed statement..."

- (i) the environmental impact of the proposed action,
- (ii) any adverse environmental effect that cannot be avoided...
- (iii) alternatives to the proposed action,
- (iv) the relation between local short-term uses...and...long-term productivity, and
- (v) any irreversible and irretrievable commitments of resources which would be involved.

Although this is one of the most significant pieces of environmental legislation ever enacted, we must not let its good intentions lull us into a sense of false security. Speaking before the House Government Operations Subcommittee on June 3, 1971, Nathaniel F. Reed, then Assistant Secretary of the Interior, said of NEPA:

"It has, however, one serious flaw. The act is basically reflective in nature and not designed to function as an effective early warning system for society's decision makers. Project review is not accomplished until such time as the proposed project design has been for all practical purposes, decided upon. Our experience to date has been that it is extremely difficult to effect project revision when the project has arrived at the Council on Environmental Quality for final review."

Neither does the need for Congressional approval offer much protection, since the Corps can spend as much as \$10 million with only congressional committee approval. Therefore, if we are to be assured that the project will cause minimal adverse environmental impacts, changes in the EIS must be effected prior to project approval.

To assist in preparing an adequate EIS, we suggest the Corps consult with other federal agencies that might have special expertise or jurisdiction in environmental planning, and that opinions also be solicited from fish and wildlife organizations, etc.

Following are specific comments concerning report omissions, insufficiencies, and inaccuracies:

I Although questions concerning the Briarwood Bird Sanctuary were raised at every public meeting and hearing this year, the report fails to recognize its very existence! According to the report, the area is slated for "snagging and

CORPS RESPONSES TO CITY OF GOLDEN VALLEY

76. The coordination section has been expanded to explain the Corps efforts to coordinate with all Federal, State and local agencies as well as groups and interested citizens. In addition, a list of all who received the draft statement is included as are all comments received on the draft statement.

77. These recommendations have been incorporated into the proposed plan and explained in the revised draft EIS. Also see response number 3, 64

clearing" in the 100 year flood plain, which could mean the complete loss of cover and habitat for a variety of birds and wildlife. Without vegetation, soil erosion possibilities are increased, resulting in greater siltation of the creek. Restoration values of birdwatching and photography opportunities in the area would also be lost. The Plan should be changed so that no modifications are made in the

Bi : Sanctuary area.

1: Clearing and snagging is planned for several areas along the channel. How is the channel defined? Is it the cross channel measurement of water at a given time, or width at near bankfull stage, or something else? What are the details of clearing and snagging? Does this mean along the creek banks only, or within the creek bed itself? What type of equipment is required for this operation? Will the equipment itself cause environmental impacts in gaining access to the area? How will the loss of cover and habitat affect the animal and fish populations? Will the water velocities be affected? Nathaniel P. Reed discussed stream channel alterations:

"...these alterations are carried out in varying degree, with a corresponding variation in damages to stream ecology. Stream channel excavation which increases the width and depth and changes alignment of a natural channel is the most damaging of these practices. Following in descending order of their detrimental effects are extensive clearing and snagging with dip out, clearing and snagging, minor snagging, and selectively cleared stream channels and or floodways."

"Channelization or other stream alteration practices destroy the balance of space and associated life supporting elements. The effects of stream alteration on fish and wildlife is somewhat analogous to the impact of Hurricane Camille on the human population along the Gulf Coast. After the hurricane (or after stream alteration) the space still remains; however, the elements within the space which support vigorous and thriving populations are no longer immediately available or arranged in a fashion so as to be usable. Fortunately, man has the capability and desire to rebuild his environment following such disaster. Fish and wildlife lack this rebuilding potential; therefore, the organisms must evacuate the damaged or destroyed habitat or perish."

H.B.M. Byers, in The Ecology of Running Waters, 1970, discusses the importance of vegetation:

"Removal of vegetation from the banks has immediate and presumably direct effects on the fish fauna...any engineering work carried out near a stream, without adequate provision for the prevention of erosion, can rapidly cause enormous changes

and, by necessity, the area of cover safety is destroyed.

24. Much of the originally proposed snagging and logging activities eliminated from the proposed plan. See Responses, p. 6.

through silting up and scour by mineral particles....Construction of any kind almost inevitably results in some erosion, and even small amounts of mineral matter cause changes in the fauna."

And from Analysing the Environmental Impacts of Water Projects, a report to the U.S. Army Engr. Institute for Water Resources, edited by Leonard Ortolano, Stanford University, March, 1973:

"The removal of 'stream cover,' which was defined to include aquatic vegetation, forest canopy, undercut banks, and natural stream obstructions, was determined to be the greatest single factor affecting fish populations. Stream cover affects water temperature... natural feeding and spawning areas, water depth and velocity, turbidity, and the types of organisms which will inhabit a stream. In effect, the study said that the more 'natural' is the stream cover in a particular location, the more likely is that stream to have a thriving fish population."

"Regarding game habitat, the hearings indicate that channel widening or straightening generally involves the removal of streamside vegetation, and in some cases, this is the only cover available as game habitat."

III. Clearing of trees which are in "imminent danger" of falling into the creek is called for in the Plan. What is the definition of imminent danger? Does it mean roots that are 5% exposed, 20% exposed, 50% exposed? Approximately how many trees will be removed? For example, in the reach between Noble and Regent Avenues, will approximately 2 trees or 15 trees be removed? There would be a great difference in the aesthetic and environmental effect of these two alternatives, even though both are relatively small numbers. How will the removal of the trees be effected? Is there a need for heavy construction equipment? How will this equipment gain access to the area?

An alternative to mass clearing of bank trees could be an improved maintenance program. Only trees whose roots are exposed by a certain percentage would be removed at the time of project construction. Other trees in lesser danger would be noted on a special maintenance map, and checked periodically and during times of high water in order to update each tree's erosion (danger) potential. Cost estimates for removing trees individually compared to mass removal should be made available.

Another possible environmental factor is that trees transpire enormous amounts of water -- will the loss of this transpiration ability have a measurable effect? And what of the loss of the stream canopy? Leaves will no longer be available for

79. See response numbers 64 and 65. Construction of this project is 4 to 5 years away. The details of the construction phase will be developed during postauthorization studies.
80. Vegetation does have high transpiration rates depending on season of year and species and age of vegetation. The trees to be removed have not been determined therefore it is not possible to predict the reduction in transpiration that would result from the project. Vegetation will be replaced and additional vegetation planted for aesthetic purposes. This would reduce the effect of the removal of vegetation or total transpiration. Tree roots do stabilize the soil. Root systems would not be removed, unless necessary, such as at culvert replacements and areas of channel widening. Barran and retaining walls constructed at critical areas to reduce erosion.

food, and shade can be a factor in the ecology of the stream also. Will erosion be accelerated without the tree roots to hold the soil? According to Ortolano: "The faster velocity of an engineered channel (versus a 'natural' channel) is caused by its smoother bed surface, straighter course, and greater slope. The channel banks are generally sparsely vegetated (if at all) and therefore are subject to accelerated erosion. The higher velocity increases erosion and allows the stream to carry greater sediment loads."

IV. The effects of channel crossing construction, riprapping, and road raises are not detailed enough to allow impact assessment. Bridge sites will doubtless be areas of intense heavy equipment activity. This will probably require surrounding areas for stockpiling debris and old crossing/culvert materials. Impacts may include noise and air pollution, disturbance of natural areas (waterfowl are quite numerous around the Regent Avenue crossing), temporary loss of aesthetic values, etc. Road construction could have similar effects. What type of riprapping will be used? Will riprapped banks be more likely to attract children, creating possible safety hazards? Nathaniel Reed states:

"Additional stream habitat degradation also occurs for some distance downstream from the altered areas. Siltation and turbidity associated with upstream channel alteration and disruption reduces light penetration in downstream waters, particularly during construction and until some reasonable degree of channel stability is achieved. This reduction in light penetration results in reduced photosynthetic activity by aquatic plants which are important links in the food chain....To me, this phenomenon is the aquatic version of the dust bowl disaster."

And from Bynes:

"It has been found that the deposition of silt or sand to stony substrata reduces their fauna, even when the deposits remain for only part of the year. (Italics ours)

V. Restoration management is given little attention in the Plan. What are the details of the plans to restore both the aesthetic and the real environment to its preconstruction condition? How much and what type of vegetation will be planted? What precautions will be taken during construction to minimize adverse impacts? What type of maintenance measures will be necessary following the project? Measures to mitigate adverse environmental effects should be implemented simultaneously with the project.

81. Air and noise pollution due to construction activities was mentioned in Section 7. The loss of vegetation at structural features is implied by the need for relandscaping and plantings to offset losses due to construction activities. Riprap was discussed in response number 65.

82. As part of the selected plan all structural features would be subjected to beautification measures. Landscaping and planting would be used to reduce the adverse effects of construction. These features were discussed in paragraph 1.19 of the draft EIS. Detailed landscape designs would be developed during the detailed project design phase. Maintenance of the flood control project would be a local responsibility.

VI. How was it determined that removal of the Minnaqua Avenue crossing was "generally acceptable" to local residents as stated in the EIS? Is the closing of this crossing compatible with the Comprehensive Plan?

83

VII. Nine homes between County 566 and T.R. 100 are to be flood proofed according to the Plan. The plan should be changed to provide these residents assurance that they will be able to choose a practical and agreeable plan to meet their individual needs and provide the necessary flood protection.

84

ADDS PROPOSES TO THE CITY OF COLLEGE VALLEY (continued)

83. Due to lack of opposition at early public meetings it was assumed that removal of the Minnaqua Avenue Bridge was generally acceptable.
84. Flood proofing has been proposed at various locations as the most economically and environmentally feasible alternative to reduce flood damages. It would be up to the individual residents to decide if they want to floodproof their home or do nothing.



City of Golden Valley

January 13, 1976

Max W. Noah, District Engineer
Department of the Army
St. Paul District, Corps of Engineers
1135 U.S. Post Office & Custom House
St. Paul, MN 55101

Dear Colonel:

We are enclosing a resolution adopted by the Golden Valley
City Council in reference to the Corps of Engineers' plan for
Bassett's Creek.

We trust that there will be additional Federal financing
so that the construction plans may be drawn.

Sincerely,

Robert R. Hoover
ROBERT R. HOOPER
MAYOR

RHE:LeV

Enclosure

cc: Robert Stensfoss, Corps of Engineers
Richard J. C'Fallen, BQFC

CERTIFICATE

CITY OF GOLDEN VALLEY

STATE OF MINNESOTA } ss
COUNTY OF HENNEPIN }

I, the undersigned, being the duly qualified and acting Clerk of the City of Golden Valley, Minnesota, hereby attest and certify that:

1. As such officer, I have the legal custody of the original record from which the attached and foregoing extract was transcribed;
2. I have carefully compared said extract with said original record;
3. I find said extract to be a true, correct and complete transcript from the original minutes of a meeting of the City Council of said City held on the date indicated in said extract, including any resolutions adopted at such meeting, insofar as they relate to:

RESOLUTION
(Army Corps of Engineers
Flood Control Plan for
Bassett Creek)

4. Said meeting was duly held, pursuant to call and notice thereof as required by law.

WITNESS my hand officially as such Clerk, and the seal of said City, this 13th day of January, 1976.

May J. Dwyer
CITY CLERK

(SEAL)

Member Anderson introduced the following resolution and moved its adoption:

RESOLUTION
(Army Corps of Engineers
Flood Control Plan for
Bassett Creek)

WHEREAS, Bassett Creek has a major impact on the City of Golden Valley, and the fact that the greatest discharge from its tributaries occurs in the winter, ice, and

WHEREAS, Bassett Creek has been of major environmental and aesthetic importance to the City, and

WHEREAS, along with the benefit to the community have come the problems of periodic flooding, and

WHEREAS, the City has been a leader in seeking ways to resolve the problem of flooding on a multi-community basis through its participation in the Corps, and

WHEREAS, the City, through its representatives on the Corps plan, has been in development of a plan to minimize the impact of flooding and to provide the Creek as an environmental and aesthetic asset to the community, and

WHEREAS, the City Council, through its representatives on the Corps plan, has been in development of a plan to minimize the impact of flooding and to provide the Creek as an environmental and aesthetic asset to the community, and

WHEREAS, these matters are still of continuing importance to the City, and the City Council, through its representatives on the Corps plan, has been in development of a plan to minimize the impact of flooding and to provide the Creek as an environmental and aesthetic asset to the community, and

WHEREAS, the City feels that Federal assistance in developing a flood control plan is a necessity due to the fact that action or inaction will affect potentially not only communities in Minnesota but also communities in other states farther down the Mississippi River;

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Golden Valley that:

1. The Army Corps of Engineers should pursue funding for the control of Bassett Creek;
2. General concept approval is given to the plan if, prior to approval of a construction plan, provision is made for further public hearings as requested at the 15 October 1975 hearing, and the matters of local concern resulting to this Council's satisfaction;
3. The Council wishes to thank the Army Corps of Engineers for its efforts to date in developing a plan to minimize the impact of flooding and to provide the Creek as an environmental and aesthetic asset to the community, and

Attest:

Donna L. Anderson
City Clerk

The motion for the adoption of the foregoing resolution was seconded by Member Johnson and upon vote being taken thereon, the following members voted in favor thereof: Anderson, Hoover, Johnson and Thorsen, and the following voted against the same: none. Whereupon said resolution was declared duly passed and adopted, signed by the Mayor and his signature attested by the City Clerk.



UNIVERSITY OF MINNESOTA
TWIN CITIES

Department of Anthropology
215 Ford Hall
Minneapolis, Minnesota 55455

August 26, 1975

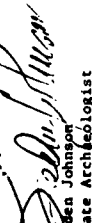
Col. Max W. Noah, District Engineer
Corps of Engineers
St. Paul District
U.S. Post Office Building
St. Paul, Minnesota 55101

Dear Col. Noah:

This is in response to your letter of 12 August 1975 asking for my comments on the proposed flood control project for the Bassett Creek watershed, Hennepin County, Minnesota.

Burial mound sites are recorded at the Medicine Lake outlet of Bassett Creek and there is the probability of other burial and habitation sites along the watercourse itself. The area has not been intensively surveyed for prehistoric sites, however, and it is my recommendation that arrangements for such a survey be made before any construction begins.

Sincerely,


Eileen Johnson
State Archaeologist

EL:dl

cc: Russell Frieley, NPS
Merrill Beal, NPS
Jack Rudy, NPS

CORPS RESPONSES TO THE STATE ARCHAEOLOGIST

85. A limited reconnaissance to determine the potential for cultural resources and to uncover any major resources in the area, has been conducted but no sites were found. An intensive survey and testing program will be undertaken prior to construction. This information has been included in the revised draft EIS.

27 AUG 1975



MINNESOTA HISTORICAL SOCIETY

600 Cedar Street, St. Paul, Minnesota 55101 • 612-296-7749

2 September 1975

Colonel Max W. Noah, District Engineer
Saint Paul District, Corps of Engineers
1135 U.S. Post Office and Customs House
Saint Paul, Minnesota 55101

Dear Colonel Noah:

RE: Draft Environmental Impact Statement
Flood Control Project
Bassett Creek Watershed
Hennepin County, Minnesota

The Survey and Planning and Archaeology sections of the Minnesota Historical Society are in receipt of your letter of 12 August 1975 in addition to Dr. Elden Johnson's statement on that letter. The Society is in agreement with Dr. Johnson in recognizing significant archaeological potential along Bassett Creek and re-emphasizes the need for a survey along this watercourse prior to implementation of any construction.

Respectfully,

Russell W. Fridley
State Historic Preservation Officer

RWF/fr

cc: Alan Woolworth, Chief Archaeologist; Minnesota Historical Society;
Building 27, Fort Snelling; St. Paul, Minnesota 55111

Charles W. Nelson, Supervisor - E.I.S.; Minnesota Historical Society;
Building 25, Fort Snelling; St. Paul, Minnesota 55111

Dr. Elden Johnson, State Archaeologist; 200 Ford Hall; University
of Minnesota; Minneapolis, Minnesota 55455

CORPS RESPONSES TO THE MINNESOTA HISTORICAL SOCIETY

86. An archaeological survey and testing of the project area will be conducted prior to initiation of construction. The testing will be intended to allow sufficient time for salvage and/or design changes to avoid problem areas.

TO: U.S. Corps of Engineers, St. Paul District Office
Bassett Creek Flood Control Commission

FROM: Mrs. Sandi Knudson
2285 Regent Avenue North
Golden Valley, Minnesota 55422

SUBJ: Public hearing October 15, 1975 at Robbinsdale St. High School on the
Sept. 1975 Draft Feasibility Report for Flood Control of the Bassett
Creek Watershed and Environmental Impact Statement.

DATE: October 20, 1975

I have thoroughly reviewed the 1975 Feasibility Report for Flood Control of the Bassett Creek Watershed and the Draft Environmental Impact Statement (EIS). I have attended several public meetings concerning the project, served on the Golden Valley Ad Hoc Citizens Advisory Committee for the project, and am a member of the Golden Valley Environmental Commission. The comments in this memo contain my personal observations and recommendations, and I request that they become part of the hearing record.

The EIS for the Bassett Creek Flood Control Project frustrates the purpose and intent of the National Environmental Policy Act (NEPA) in that it does not adequately identify and analyze the potential adverse impacts of the project. At public meetings since May of 1975 citizens have consistently questioned Barr, Engineering and the U.S. Corps of Engineers on specific impacts to various areas. We have pointed out particular areas which may be most susceptible to environmental damage, and we have urged preliminary environmental information so citizens could assess all aspects of various plans, not just economic considerations. But almost no environmental information was available until the Corps had selected its plan — 6C. The EIS was prepared as the final documentation for a decision that had already been made, instead of input for making that decision; thus negating the potential benefits of the entire environmental impact statement process. The process was used as a paper work exercise instead of the decision-making tool it should be.

Instead of beginning early in the planning stages to develop the environmental analysis (as was done with the cost analyses) the EIS was left to the last minute. Chances to refine the Statement and gain public input on environmental aspects were lost. An excellent example of the value of public input is the Briarwood Bird Sanctuary incident. My husband and I (and other citizens) have tried to get a clarification on plans for the Bird Sanctuary since May of 1975. Located on the reach of the creek between Regent Avenue and T.J. 100, it is a dedicated natural area set aside by the City of Golden Valley in the G.V. Comprehensive Plan, but none of the Barr maps had identified it as such. Every time we questioned, we were given assurances that Barr and the Corps were aware of it. But when the EIS was finally released, there was no mention of this dedicated natural area! Plans for that reach of the creek stated that brush and trees could be removed from the 100 year flood plain. Depending on interpretation, this could mean removal of all brush and cover in the Bird Sanctuary — completely destroying the habitat for both birds and animals. That would certainly cause a severe adverse environmental impact, and yet it wasn't

CORPS RESPONSES TO MRS. SANDI KNUDSON

87. The Briarwood Bird Sanctuary has been recognized in the revised draft EIS. As noted in responses 3 and 69 clearing and snagging have been eliminated except for approximately 0.6 mile between Irving Avenue North and just upstream of the Penn Avenue Bridge and for about 800 feet upstream of the flood control structure to be located at Highway 100.

even dealt with in the Statement: This single incident makes one question the credibility of the entire report.

When the 31rd Sanctuary was mentioned at the public hearing, Colonel Noah responded that the Corps "will try not to do anything in there without you all knowing about it." Those of us who have property abutting the 31rd Sanctuary do not want the habitat disturbed, and telling us what is going to be done offers us no protection whatsoever, just a greater availability of information than in the past.

Because the EIS is so inadequate, I believe the draft should be rewritten and citizens in the 9 communities given another opportunity for full public review. The intent of NEPA has certainly not been satisfied by the EIS, and the public must have an opportunity for review prior to sending the Statement on for review by the federal agencies.

I suggest the following additional improvements be undertaken in the EIS to satisfy the intent and potential benefits of the environmental impact statement process:

1. Utilize a systematic and interdisciplinary approach as required by Section 102 of NEPA.

A. Comments from other state and federal agencies that might have special expertise or jurisdiction should be solicited before preparation of the final draft EIS. A representative from the State Department of Natural Resources attended the hearing and stated a desire to be involved in fish and wildlife management plans, recreation use and aesthetics. This Department might also be very helpful in formulating restoration and management plans. Other agencies and organizations should be involved as well.

B. Although Colonel Noah stated at the hearing that a number of biologists had worked on the EIS, there was little evidence of this in the Statement. We need better information on the effects of various project plans on fish and wildlife populations, vegetation, and biota of the stream. More vegetation surveys taken, for example, to determine if there are any endangered species growing in the flood plain?

2. Definition of terms is nonexistent. Terminology such as "riprapping", "clearing and snagging", "channel", "imminent danger", "less severe", "generally acceptable", and "minimum disruption" is extremely unclear. Technical terms should be defined, and the more general terms clarified or replaced with more specific parameters.

3. Restoration management and maintenance must be given more attention. We need to know exactly what type of action will be taken to alleviate adverse environmental impacts of plan implementation. What actions must be taken later to return the environment to its natural state? Restoration measures must be implemented simultaneously with the project in many cases if they are to be most effective.

CORPS RESPONSES TO MRS. S. KIMDSON

98. The draft EIS was prepared prior to the public hearing. Public involvement continues through out the planning process. As a result of the public hearing and various comments of agencies, groups and individuals, the proposed plan has been and continues to be modified as appropriate.
99. As noted above coordination is a continuing process. See letters from the various Federal and State agencies in this report as well as section 9.
90. The environmental assessment, cited in paragraph 4.01 of the draft EIS, prepared by Warr Engineering Company included a list of fish and wildlife resources and biota of Bassett Creek. The lists were used to assess environmental impacts but were too tentative to include in the draft EIS. Also, the U.S. Fish and Wildlife Service and Minnesota Department of Natural Resources were contacted to determine the existence of threatened or endangered species of vegetation. Telephone consultations revealed that none are in the Bassett Creek area. The explanation of the absence of fish and wildlife has been explained in the revised draft EIS. See section 4.
91. See responses number 84 and 90. Further, finally, all of the terms have been made in the revised draft EIS. Some of the terms it is not possible to predict the future of the project. The activity and it is only possible to predict the future of the project in general terms.
92. Restoration measures and lands are treated to reduce the adverse effects of construction or structures would consist of landscaping, sodding, and planting of trees and shrubs. These measures would take place immediately after construction. They would be further defined during more advance stages of planning.

CORPS RESPONSES TO MRS. SANDI KNUDSON

4. Abandon plans for clearing and snagging in the Briarwood Bird Sanctuary. If the intention is to use the area for inundation storage, vegetation will help hold down erosion and slow the water from emerging the channel. May I also suggest that Comprehensive Plans in the nine communities be rechecked in areas where alterations are planned, so the Bird Sanctuary problem does not reoccur elsewhere.

5. The Feasibility Report and EIS seem overly concerned with aesthetics, but not with the actual environmental damage. Aesthetics are important, but citizens are concerned with effects on water quality, wildlife habitat, siltation, turbidity, and other impacts as well.

6. It is interesting to note that in the list of references used for the report, there is not one ecological work cited.

A final observation concerns the lack of availability of information on the Feasibility Report and EIS prior to the October 15, 1975 public hearing. The plan was not available on 2 occasions (10 day span) when I went to review it at the Golden Valley Public Library. The Librarian had received the Plan, was unsure of what to do with it, and sent it on to the Library's District Office for cataloging. There was no other public place in Golden Valley where the plan could be used in the evening hours.

I am in sympathy with those who currently suffer from creek flooding, and definitely see a need for a flood control plan. I do not believe, however, that any plan is better than no plan at all. The Corps' goal must be to design the best and most effective plan possible, with the least possible adverse environmental impacts. Until the adverse impacts are fully assessed, it is impossible to make a selection of "best plan."

In conclusion, I repeat the recommendation that the EIS be rewritten, the proposed plan modified if necessary to reflect the EIS rewrite, and that the public have an opportunity for full review at a second public hearing.

93. As noted earlier, most of the originally proposed clearing and snagging has been eliminated from the proposed plan. Significant modification of the proposed plan has been made as noted in the revised EIS to be responsive to public desires and needs and recommendations by Federal and State agencies (for example the flood levels originally proposed for Medicine Lake have been altered to offer less impact in northern pike spawning areas).

94. Aesthetic compensate for considerations are included in the proposed project to help the environmental impacts of construction. Adverse impacts on the environment were discussed in section 4 of the draft EIS, and this discussion has been expanded in the revised draft EIS.

95. Various biological data was used in the preparation of the environmental assessment report and a list of these references is available at the St. Paul District Office. See also response 8 for other references on the effects of urbanization on hydrological processes.

96. The draft EIS was mailed on 10 September 1976 to several libraries and city offices as indicated in the coordination section, where it was available for review. Copies were also available on request by the St. Paul District Office.

97. See responses numbers 71, 88.

DORSEY, MARGARET WINDHORST, WINDHORST AND MALLADAY

2300 FIRST NATIONAL BANK BUILDING
MINNEAPOLIS MINNESOTA 55402

TEL: 340-2800
TELETYPE: 340-2800
TELEFAX: 340-2800

1488 W. FIRST NATIONAL BANK BUILDING
ST. PAUL, MINNESOTA 55101

JONATHAN VILLAGE CENTER
CHAS. J. VILLAGE CENTER
118 1/2 STREET SOUTH
ST. PAUL, MINNESOTA 55101

November 10, 1975

Colonel Max W. Noah
District Engineer
St. Paul District, Corps of Engineers
1135 U.S. Post Office & Custom House
St. Paul, Minnesota 55101

HAND DELIVERED

Dear Colonel Noah:

We represent Mr. Wallace E. Freeman who owns property adjoining Bassett Creek south of Highway 55 and west of County Road 18 and is thereby directly affected by the proposed action as contained in the U.S. Army Corps of Engineers, September, 1975, Preliminary Draft, Feasibility Report for Flood Control in the Bassett Creek Watershed (hereinafter "Draft Report").

The primary purpose of this letter is to advise you of the impact of the selected plan as outlined in the Draft Report on Mr. Freeman's property and how this impact may differ from what is disclosed in the August, 1975, Draft Environmental Impact Statement, Flood Control Bassett Creek Watershed, Hennepin County, Minnesota (hereinafter "Draft Statement"), prepared by the U.S. Army Corps of Engineers.

The present 100-year flood level in the area where Mr. Freeman owns property is between 887 and 888 feet and it is on the 888 foot elevation that Mr. Freeman for several years has based his plans for developing his property. On May 15, 1972, the City of Plymouth zoned this property for commercial and multiple residential property and approved Mr. Freeman's development plans which were based on a 100-year flood level of 888 feet. The selected plan as set out in the Draft Report, as we understand it, would increase the 100 year flood level over Mr. Freeman's property by at least one foot to 889 feet. If storage for flood waters to a level of 839 feet is necessary over Mr. Freeman's property, we estimate that approximately 20 acres of commercial

CORPS RESPONSES TO DORSEY, MARGARET, WINDHORST AND MALLADAY

98. Development of the property in question is, at the present time, subject to the policies of the Bassett Creek Flood Control Commission. In accordance with the "Watershed Management Plan for Bassett Creek," adopted by the Commission in 1972, land use of a type which would be damaged by floodwaters is not permitted below elevation 890 in this area. Allowable types of land use below elevation 890 would include parking areas, storage areas, recreation areas, and open space if they do not increase flooding. The Management Plan allows filling of areas below elevation 890 for development if compensating flood storage or increased channel capacity can be provided. It is proposed to reduce the 100-year flood discharge at Winnetka Avenue from 830 cubic feet per second to 400 cubic feet per second. To reduce the discharge to 400 cubic feet per second, 500 acre-feet of flood storage must be provided upstream of Winnetka Avenue. It was assumed that private properties with existing land use plans and, therefore, the resulting proposed flood level was determined to be elevation 889.

Colonel Max W. Noah
Page -- Two

November 10, 1975

and multiple residential property would be effectively removed from development (approximately 6 acres of Mr. Freeman's property lying below the 889 foot level having already been removed from development and presently being used as a pond area). The tax assessor has estimated that the fair market value of Mr. Freeman's 59 acres is \$483,000, or more than \$8,000 per acre. Of course, this is only the tax assessor's valuation; the present, actual value could be much higher. If 20 acres of Mr. Freeman's property are removed from development, the community would suffer the loss of tax production as well as the loss of potential new jobs and residential facilities which could be generated by development of this land. Mr. Freeman would suffer substantial losses, including the financial expenses incurred in formulating development plans for, and obtaining new zoning of, his property and the loss of his property itself for which he would have to be justly compensated. In view of such losses, if the selected plan requires that a substantial portion of Mr. Freeman's property be used for flood water storage, we respectfully submit that the Final Environmental Impact Statement ought not only to identify such losses, which we believe the Draft Statement omits to do, but also ought to give some indication why it is necessary to use private property rather than public property for such flood water storage purposes.

Our understanding, however, as obtained through a study of the Draft Report and a meeting on October 9, 1975, with Len Crammer of Barr Engineering, Bob Stenfors of the Corps of Engineers and Curtis Pearson, Counsel for the Bassett Creek Flood Control Commission, is that no portion of Mr. Freeman's property is required for flood water storage purposes beyond the existing pond area on his property. We are troubled, though, because we believe that the Draft Report omits, or at best does not clearly state, information necessary to arrive at this conclusion and we have so indicated in a statement, dated November 10, 1975, to the U. S. Army Corps of Engineers, St. Paul District, the Bassett Creek Flood Control Commission and the Mayor and Council of the City of Plymouth, which statement is attached hereto and made a part hereof by reference.

If our understanding as obtained through such study and the October 9th meeting is correct, then the impact on Mr. Freeman's property is minimal with one exception. That is, that even if no portion of Mr. Freeman's property is required for flood water storage purposes, it will be necessary for Mr. Freeman, at the very least, to fill portions of his land to an elevation of 890 feet in order to develop it in accordance with his development plans formerly submitted to the City of Plymouth. Such cost of floodproofing is not included in the Draft Statement. We respect-

CORPS RESPONSES TO DORSEY, MARQUART, WINDHORST AND HALLADAY

99. Existing policies of the Bassett Creek Flood Control Commission would require damageable property to be located above elevation 890 in this area. Therefore, portions of the property would have to be filled to approximately elevation 891 with existing conditions. With proposed conditions, damageable property would have to be located above elevation 889 which would require portions of the property to be filled to approximately elevation 890. The cost to flood proof the property would, therefore, be less with proposed conditions than the cost to flood proof with existing conditions. Also see responses to General Mills comments.

Colonel Max W. Noah
Page -- Three

November 10, 1975

fully submit that this cost should be recognized in the Final Environmental Impact Statement and Mr. Freeman should be compensated accordingly.

We, therefore, here request, as requested by said statement, that this Draft Statement be clarified and supplemented to conform to our above expressed understanding of it, and that the Draft Report likewise be revised to take into consideration such clarifications and supplements, and, once so done, that we again be given the opportunity to review and comment.

Very truly yours,

DORSEY, MARQUART, WINDHORST, WEST
& HALLADAY

By: 
Thomas S. Erickson
Attorneys for Wallace E. Freeman

TSE:myh
Enclosures

General Mills, Inc.
General Offices

Post Office Box 1113
Minneapolis, Minnesota 55440

November 14, 1975

Colonel Max W. Noah
District Engineer
St. Paul District, Corps of Engineers
1135 U.S. Post Office & Custom House
St. Paul, MN 55101

Re: COMMENTS OF GENERAL MILLS, INC. REGARDING BASSETT CREEK WATERSHED, HENNEPIN COUNTY, MINNESOTA
REGARDING: FEASIBILITY REPORT FOR FLOOD CONTROL (PRELIMINARY DRAFT SUBJECT TO REVISION) SUBMITTED BY U.S. ARMY CORPS OF ENGINEERS, ST. PAUL DISTRICT, SEPTEMBER, 1975, AND

DRAFT ENVIRONMENTAL IMPACT STATEMENT -- FLOOD CONTROL, BASSETT CREEK WATERSHED, HENNEPIN COUNTY, MINNESOTA, AUGUST, 1975, PREPARED BY U.S. ARMY CORPS OF ENGINEERS, ST. PAUL DISTRICT

(151)

General Mills, Inc. is currently the owner of approximately 216 acres of real estate located in Golden Valley, Minnesota, between Minnesota Highway 55 on the north, Hennepin County Road 18 on the west, Boone Avenue and Brookview Golf course on the east and Minnesota Highway 12 on the south. An outline of these lands owned by General Mills is shown on Exhibit A attached to this statement. This property includes all of the property adjacent to Bassett Creek as it flows between County Road 18 to the west and Boone Avenue to the east and, as shown on Exhibit A, is the location of General Mills' main headquarters office consisting of four buildings, parking areas and landscaping and an exterior maintenance building which is adjacent to an automotive service center.

General Offices and Betty Crocker Kitchens at 9000 Weyzata Boulevard

CORPS RESPONSES TO GENERAL MILLS, INC.

All of the above referenced lands lie within the limits of the City of Golden Valley which has adopted a flood plain ordinance establishing a flood plain level for the lands owned by General Mills, Inc. at the 890 foot elevation. Approximately 105 acres of General Mills' property shown on Exhibit A lie below that level. At this time the acreage below that level remains undeveloped with the exception of some parking and roadway improvements. The shaded areas shown on Exhibit B generally indicate General Mills' lands and adjacent properties which lie below the 890 foot elevation level.

Because of the substantial value of properties owned by General Mills which are at or below the 890 foot flood plain level, it is imperative to General Mills that such properties or as much thereof as possible be released from flood plain restrictions and limitations imposed by the ordinance so as to allow development and to maintain a reasonable market value of the same. The tax assessor has estimated the fair market value on these vacant properties to be more than \$1,588,000.00 for purposes of computing taxes for the year 1974.

After careful review and consideration of the plan, General Mills' position at this time is that it cannot support adoption of the same because, as proposed, the plan would result in substantially more flooding on General Mills' properties than would now occur if a 100 year flood were to occur. Although the current flood plain level by ordinance is set at the 890 foot elevation level, this level was established at a higher level than necessary to accommodate a flood of that magnitude in order to provide for a flood plain "envelope". If a 100 year flood were to occur now, the highest level of resulting flood waters which

100.

Neither the policies of the Bassett Creek Flood Control Commission nor the provisions of the Golden Valley Flood Plain Ordinance completely restrict development below the current flood zone elevation of 890. The Commission's policy allows filling of the floodplain with compensating flood storage and/or channel improvement so that the flood level would not be increased at any point along the channel. Golden Valley's Flood Plain Ordinance allows filling to the extent that reasonable anticipated uses would not unduly affect the efficiency of the floodplain or unduly increase flood levels assuming an equal degree of encroachment for a significant reach on either side of the stream. Any use which increases the flood level by more than 0.5 foot per reach or the cumulative effect of several reaches or increases flood damage is deemed to unduly decrease the capacity of the channel or floodplain.

The proposed plan would lower the 100-year floodplain elevation to 889 as shown on the profile on plate H-17 of the feasibility report. It is expected that current floodplain regulations would be amended to reflect proposed project conditions and the above-mentioned policies would then apply to the floodplain below elevation 889.

Colonel Max M. Noah

Page 3
11/14/75

would flow onto General Mills' property would be to the 888 foot elevation with little adverse impact or inundation of the property.

Further, General Mills cannot support the plan because of the inadequacy of the Feasibility Report (Report) and Environmental Impact Statement (Statement) to which these comments are addressed. The engineering and other technical data, as well as cost data, appear to be incomplete, and the examination of the social and economic impact of the plan is inadequate as proposed. Although we support the stated objective of the plan to utilize primarily recreational and public lands for flood water retention purposes, we are concerned that there are no clear and binding assurances that other properties will not, in fact, be inundated at the flood levels suggested or will be removed from the stringent restrictions placed upon flood plain areas.

(153)

The concept of creating higher flood levels in suburban areas with resulting restrictions on development of vacant lands in order to minimize the effects of a flood control program in the City of Minneapolis, where much of the development is old and in need of renovation, appears to us to be an unsound concept from an economic and social standpoint. Adoption of a plan which would call for drainage through the City of Minneapolis via open channel rather than by conduit would minimize the necessity of constructing upriver controls, and such alternative plans appear to require further study and consideration before a final plan is adopted and implemented.

INADEQUACY OF ENGINEERING DATA

The plan as proposed and recommended indicates that adoption and implementation of the plan will remove substantially all of General Mills' acreage from flood

101

CORPS RESPONSES TO GENERAL MILL, INC. (continued)

101. The existing 100 year floodplain elevation of the area in question is approximately elevation 888 as shown on plate H-17 of the feasibility report. The existing 100-year flood discharge at Winnetka Avenue is 830 cubic feet per second as listed in Table 4, page H-17 of the report. To reduce flood damage in the reach of Bassett Creek from Winnetka Avenue to Highway 100 in Golden Valley, it is proposed that the 100-year flood discharge at Winnetka Avenue be reduced to 400 cubic feet per second as listed in Table 4, page H-17 of the report. To reduce the discharge at Winnetka Avenue from 830 cfs to 400 cfs, 500 acre-feet of flood storage volume must be provided upstream of Winnetka Avenue. Assuming that private properties between Brookview Community Park and County Road 17 were completely filled and developed providing no flood storage on private properties, then the 100-year flood level would be approximately elevation 889 or 1 foot above the existing flood level of approximately elevation 888 as mentioned in the report on page F-33. The control structure at Winnetka Avenue would have a 25-foot-long overflow weir with a crest at elevation 885 and a low-flow culvert with invert at elevation 879. With a standard project flood, the structure at Winnetka Avenue would be inundated and the water surface profile would approach normal or existing conditions. The estimated elevation of the standard project flood in the area of General Mills is 890.

CORP. RESPONSE TO GENERAL MILLS, INC. (continued)

consistent with the city of Golden Valley's existing Flood Hazard Ordinance, in a means into the floodplain (below elevation 990) are allowable if they do not unduly affect the capacity of the floodplain. Development of these "flood fringe" areas requires that all dammable property be elevated or flood proofed to the regulatory flood protection elevation. It is expected that elevating structures on fill or flood proofing structures will be less expensive than the flood protection elevation would be (are economically feasible) than flood barriers or means of flood protection. Dammable property such as houses, factories, and industrial buildings are acceptable uses of floodplain and do not require flood protection.

Time Russell Creek is not yet subject to the provisions of the Federal Water Pollution Control Act Amendments of 1972, it will be premature to assess the possible impacts of this legislation on the proposed flood control program for the assessment. If necessary, a study for funding the post-fertilization study phase under the Section 404 permit will have been in effect and work will be underway.

Time Bissett Creek is not yet subject to the provisions of the Federal Water Pollution Control Act Amendments of 1972, it would be premature to assess the possible impacts of this legislation on the proposed flood control project at this time for the assessment. If necessary, and if the Board should authorize the project, the assessment would be required. The post authorization study plan within the Executive Order will have been in effect and more data will be available.

the consented barriers and it would be required to protect private property from encroachment. If the proposed road indeed appears to be substantially limiting

the purchase of private lands for construction of the same. The cost of taking these lands and construction of such barriers must be considered in examining the feasibility of the proposed plan. In addition, the construction of barriers may be difficult by reason of possible effect of the same upon protected "wetlands" areas. (See 40 Fed. Reg. No. 144 dated July 25, 1975). Conflicting legislation of this nature must be considered in evaluating any flood control plan.

ALTERNATE PLANS

The proposed plan utilizes suburban undeveloped or recreational properties as reservoir areas with substantial capital expenditures to be undertaken to provide the necessary channel improvements and control structures to contain waters in the designated suburban retention areas. In addition, as indicated in the discussion above, additional barriers and property acquisitions are required beyond those anticipated in the plan to prevent flowage of flood waters from the retention and reservoir areas onto private properties. This plan is being considered for adoption to allow for use of an underground conduit for flowage of waters from the Bassett Creek Watershed through the Minneapolis area into the Mississippi River. The Report indicates that the City of Minneapolis is examining the possibility of engaging in a redevelopment program for the area in Minneapolis under which the existing conduit is located. A redevelopment program, if implemented, could coincide with a Bassett Creek flood control plan whereby an open channel might be constructed to permit unrestricted flowage of water through the Minneapolis area which would, in turn, substantially reduce the necessity for upriver flood control measures such as those proposed in the plan submitted.

103.

If an open channel were constructed to replace the existing conduit, it would not affect the amount of storage required in upstream communities to prevent damage in those reaches unless all of the existing restrictive channel crossings were enlarged and the channel modified to permit unrestricted flow of the 100-year flood discharge. At the present time, there are 26 restrictive channel crossings on the main stem of Bassett Creek between the existing conduit entrance and the Brookview Community Park. In order to permit unrestricted flow of the 100-year flood discharge, all of these crossings would have to be replaced with bridges and the channel between the conduit entrance and Brookview Community Park would have to be enlarged substantially. Because channel modifications and realignments are socially unacceptable to residents of the watershed, as discussed in the report (page C-11) and draft EIS (paragraph 6.4j), and because the extensive modification of the channel and crossings would be economically infeasible, a plan to provide unrestricted flow for the 100-year flood was eliminated as a possible alternative early in the planning process.

until the City of Minneapolis completes a study regarding redevelopment possibilities and alternatives, no major flood control project should be undertaken. The Bassett Creek Flood Commission and Corps of Engineers should not adopt a plan in haste to coincide with highway construction in order to receive financial participation from the Minnesota Highway Department when further examination of other alternatives, such as the redevelopment of portions of Minneapolis, may even more substantially reduce the cost of flood control and, simultaneously, enhance the affected areas of Minneapolis. The feasibility of any flood control plan cannot be fully determined unless this alternative is carefully examined. A careful study should be made regarding the impact upon values of affected properties with regard to each of the plans under consideration.

ECONOMIC IMPACT

As previously discussed in this statement, because of the inadequacy of the information in the Report regarding alternative plans and the failure to consider all of the land takings and improvements that may be necessary to implement the plan as proposed, the plan should not be adopted or implemented until thorough engineering design and data collection is completed and submitted for public review and comment. As indicated above, a very significant economic factor might be the inclusion of redevelopment funds and adoption of a redevelopment program for the affected areas of Minneapolis.

Cost estimates regarding alternative plans must include the values of properties affected and decreases in those values by reason of the same being contained in the proposed reservoir areas and otherwise located below flood plain levels.

CORPS RESPONSES TO GENERAL MILLS, INC. (continued)

104. If the proposed project were implemented, it is expected that the existing flood zone elevation contained in Golden Valley's Flood Plain Regulations would be amended to approximately elevation 889 depending upon the outcome of later, more detailed studies. The amended ordinance would continue to allow development of the floodplain (areas below elevation 889) to the extent that its anticipated use would not unduly affect the efficiency of the floodplain. Because the necessary flood storage volume (500 acre-feet) can be obtained on existing public properties and because private properties could be developed consistent with the ordinance, it is not expected that property values would change appreciably from existing conditions.

These loss of values are a very real part of the overall cost of any plan even if they are not actual expenditures made for acquisitions and improvements. Though many of these properties may not be acquired to implement the plan, an analysis of the economic impact is not complete unless it includes information regarding impact upon land values and, in addition, impacts upon the economic and social environments in the areas around the affected lands.

Removing commercial, residential and industrial properties from consideration for future development or imposing stringent limitations and costly requirements as a condition of development has a very real impact upon the financial and social wellbeing of social, commercial, industrial and public institutions and facilities in the area. For example, General Mills estimates that the 105 acres currently located within the existing flood plain elevations as referenced above could, if improved, provide facilities for up to 1,500 additional employees and result in improvements costing upwards of \$18,000,000.00. This number of additional employees would have a substantial long-term impact upon the general economy and wellbeing of the communities surrounding General Mills' property and the entire metropolitan area. Further, the improvements which could be constructed on such lands would result in substantial increases in total tax dollars flowing to the city, county and state in which the improvements are located.

Funds expended in the construction of improvements of that magnitude significantly affect the economy of the entire metropolitan area in terms of salaries and wages paid and the sale, manufacture or production of materials and fixtures. This economic impact of initial construction is one which cannot be realized from

currently developed properties unless and until such developments or improvements are removed and the underlying properties reimproved. These economic and social factors have not been adequately examined or reflected in either the Report or the Statement.

LACK OF ASSURANCES

Although the drawing attached to the Report (see Plate 2) indicates that private properties will, for all practical purposes, be removed from the flood plain upon implementation of the proposed plan, there is no recognition of that in the text of the Report nor are there assurances from the City of Golden Valley that upon implementation of the proposed plan, only those areas shown in that drawing as being retained for flood control use and storage purposes will continue to be controlled and restricted under the flood plain ordinance. The plan should clearly state the effect of implementation of the same upon lands now contained in the flood control "envelope" not then required for storage of flood waters. Will these areas be removed from the limitations now imposed by the flood plain ordinances and will they then be available for development?

CONCLUSION

As indicated above, General Mills, Inc. cannot support the plan proposed in the Report until the plan and alternative plans are re-examined and additional data is submitted and made available for public information and scrutiny pertaining to the feasibility of the alternative plans, including anticipated flowage rates, total storage needs required at each reservoir area, feasible means of separating reservoir areas from adjacent private areas lying at the same or lower levels


Page 9
11/16/75

Colonel Max W. Noah

and provided, further, that the full economic and social impact of the plans are carefully studied and reviewed. In addition, the Report should contain firm assurances that a substantial amount of the acreage now under flood plain controls would be removed from the same upon implementation of the plan as proposed.

Respectfully submitted,

GENERAL MILLS, INC.


J. W. Haun
Vice President
Engineering Policy

JMH/bae



UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY

REGION V
230 SOUTH DEARBORN ST
CHICAGO ILLINOIS 60604



COPIES FURNISHED TO U.S. ENVIRONMENTAL PROTECTION AGENCY

1. The pollutional nature of excavated material will be determined in the general design stage, as will acceptable excavation techniques. Disposal sites will also be selected at that time.

NOV 11 1976

Colonel Marvin W. Rees
Executive Director of Civil Works
Department of the Army
Office of the Chief of Engineers
Washington, D. C. 20314

RE: 76-070-194
DS-COE-F36029-MN

Dear Colonel Rees:

In response to your letter dated August 17, 1976, we have reviewed the Revised Draft Environmental Impact Statement and Feasibility Report for Flood Control, Bassett Creek Watershed, Hennepin County, Minnesota. Our comments on the Draft EIS dated November 1, 1975, expressed environmental reservations about the effects of the project on wetlands and water quality. We realize that post-authorization studies will be necessary to adequately address our concerns. Based on the responses to our earlier comments, we do not anticipate any unresolvable environmental problems with this project. Therefore, we have classified our comments as Category LO-2. Specifically, this means, we have no major objections to the project; however, we believe additional information is necessary to fully evaluate the environmental impacts. This classification and the date of our comments will appear in the Federal Register.

(16)

We are particularly concerned that the excavation and disposal of 250,000 yards of material does not degrade water quality. We expect post-authorization studies to adequately address this problem as well as others included in our review of the Draft EIS.

The efforts by the upstream community of Plymouth to acquire, preserve, and improve wetlands is commendable. Since these areas are related to the Bassett Creek project, we believe the Corps should provide assistance to the City of Plymouth to the extent necessary to improve the beneficial environmental impacts of the Bassett Creek Flood Control Project.

Thank you for providing us with the opportunity to review the Revised Draft EIS. Please provide us with two copies of the Final EIS at the same time it is submitted to the Council on Environmental Quality.

Sincerely yours,

Gary A. Williams

Gary A. Williams
Chief,
Environmental Review Section



DEPARTMENT OF AGRICULTURE
OFFICE OF THE SECRETARY
WASHINGTON, D. C. 20250

11 November 1976

Lieutenant General J. W. Morris
Chief of Engineers
Office of the Chief of Engineers
Army Corps of Engineers
U. S. Department of the Army
Washington, D. C.

Dear General Morris:

This is in response to your letter of August 17, 1976, transmitting for our review and comments your report with pertinent papers and revised draft environmental impact statement on Bassett Creek Watershed, Minnesota.

Comments are enclosed for your consideration when preparing the final report.

Sincerely,


ROBERT W. LONG
Assistant Secretary

Enclosure

U. S. Department of Agriculture
Comments on Report and Draft Environmental Impact Statement
Bassett Creek Watershed, Minnesota

Report

1. We note from the display of accounts on page D-50, that regional impacts were not evaluated. Some discussion of plan effects on regional economic activity and employment would enhance the report.
2. The report should state more clearly whether the flood proofing features of the plan have been included in the benefits and costs. In the materials on cost apportionment on pages 102, 103, and Appendix G, the cost sharing arrangements for flood proofing, if any, are not discussed.
3. In table 13, page F-20, the units of recreation participation should be defined; in table 15, page F-21, participation rates should be defined, e.g., as rates per 100, or 1,000.

Environmental Impact Statement

4. Page 28 is missing from our copies of the Revised Draft Environmental Impact Statement.



DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS
U.S. COAST GUARD (G-WS/73)
WASHINGTON, D.C. 20314
PHONE: (202) 426-2262

• 11 November 1976

Lieutenant General J. W. Morris
Chief of Engineers
Department of the Army
Washington, D. C. 20314


Dear General Morris:

This is in response to your letter addressed to Secretary Coleman concerning a revised draft environmental impact statement on Bassett Creek Watershed, Hennepin County, Minnesota.

The concerned operating administrations and staff of the Department of Transportation have reviewed the material submitted. We have no comments to offer nor do we have any objection to this project.

The opportunity to review this draft statement is appreciated.

Sincerely,


D. A. Smith
Captain, U. S. Coast Guard
Deputy Chief, Office of Marine
Environment and Systems
By direction of the Commandant.

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C.

SEP 25-76/624

17 November

Dear General Morris:

The Department of the Interior has reviewed the proposed report on Bassett Creek Watershed, Minnesota, and the revised draft environmental impact statement as requested in your August 17 letter.

Potential conflicts with Section 6(f) of the Land and Water Conservation Fund Act were brought to the attention of the Corps of Engineers, St. Paul District Office, by the Bureau of Outdoor Recreation's letter of October 31, 1975. These conflicts have not yet been resolved to the satisfaction of this Department. The Corps has coordinated the proposal with the State Office of Local and Urban Affairs. As a result, the Corps stated in the revised EIS that no conflict existed, however, the Regional Office of the Bureau of Outdoor Recreation informed the Planning Division of the St. Paul District of the Corps by telephone October 17, 1976, that the temporary use of these lands for flood storage would constitute a conflict under Section 6(f).

In order to resolve the conflict involving Jordan Park (Project 27 - 00620), also known as Bassett Creek Park, and Broadview Recreation Area (Project 27 - 00478) the park area to be inundated by the flood control project must be identified so that this Department can determine if replacement lands will be required. We believe the report of the Corps of Engineers and the final EIS should discuss this conflict and note that resolution will be accomplished in the detailed planning for the project.

Very truly yours,

Enclosed for the attention of the St. Paul District Office are two copies of the proposed report on Bassett Creek Watershed, Minnesota, and the revised draft environmental impact statement as requested in your August 17 letter. The report has been reviewed by the Department of the Interior and the St. Paul District Office. The report has been reviewed by the Department of the Interior and the St. Paul District Office. The report has been reviewed by the Department of the Interior and the St. Paul District Office.



The Department of the Interior
to review your proposed report
for the Bassett Creek Watershed.

Sincerely,



Assistant Secretary of the Interior

J. W. Morris
Lieutenant General, USA
Chief of Engineers
Department of the Army
Washington, D. C. 20314

STATE OF MINNESOTA
DEPARTMENT OF NATURAL RESOURCES
 CENTENNIAL OFFICE BUILDING • ST. PAUL, MINNESOTA • 55155

December 15, 1976

DNR INFORMATION
 (612) 296-6157

Colonel Forrest T. Gay
 St. Paul District, Corps of Engineers
 1135 U.S. Post Office & Custom House
 St. Paul, Minnesota 55101

Dear Colonel Gay:

**BASSETT CREEK WATERSHED FEASIBILITY REPORT FOR FLOOD CONTROL AND
 REVISED DRAFT ENVIRONMENTAL IMPACT STATEMENT**

The Department of Natural Resources has received the Feasibility Report for Flood Control and the Revised Draft Environmental Impact Statement for the Bassett Creek Watershed. Both documents adequately address Department of Natural Resources concerns.


4 The Department continues to recommend construction of a rough fish barrier on Plymouth Creek upstream from Medicine Lake. This barrier would materially improve the Plymouth Creek and Medicine Lake fisheries by aiding in the elimination of carp from wetland areas along the creek and by reducing the supply of young carp to the lake.

5 There is also a critical need for a public access site on Medicine Lake. We would suggest that the feasibility of the development of this site be examined in conjunction with plans for reconstructing the lake's outlet structure.

Since these reports were written, additional progress has been made on the implementation of flood plain regulations. The City of Crystal has adopted a state approved flood plain zoning ordinance. Flood insurance studies are nearing completion for the cities of Maple Grove, Plymouth, Crystal, St. Louis Park and Robbinsdale and are underway for Minneapolis, Golden Valley, Minnetonka and New Hope.

The Department would like to commend the authors of both reports for their thorough and accurate analysis of non-structural alternatives. These reports should be used as a model for future Corps of Engineers flood control studies.

Sincerely,


 Robert L. Herbst
 Commissioner of Natural Resources

RLH

*Have a very nice
 Christmas!*

AN EQUAL OPPORTUNITY EMPLOYER

CORPS RESPONSES TO THE MINNESOTA DEPARTMENT OF NATURAL RESOURCES

4. The feasibility of placing a fish barrier on Plymouth Creek will be investigated during the general design stage. We will contact you on this matter.
5. The feasibility of providing public access on Medicine Lake will be investigated during the general design stage.



DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
WASHINGTON, D.C. 20314

REPLY TO
ATTENTION OF:

DAEN-CWP-C

9 February 1977

SUBJECT: Revised Draft EIS, Bassett Creek, Minnesota

District Engineer, St. Paul, ATTN: Chief, Engineering Division

I have inclosed copies of State and Agency comments on the proposed Chief's report and on subject EIS. I have provided these for your files and for your use in preparing the final EIS and if necessary, updating the SOF.

2. We require fifteen copies of the FEIS, together with signed copies of the SOF, if revised, sent to this office through NCD by 11 March 1977.

FOR THE CHIEF OF ENGINEERS:

(167)

6 Incls
Cmt ltrs

Alex Shwaiko
ALEX SHWAIKO

Acting Chief, Planning Division
Directorate of Civil Works

CF:

NCD, Attn NCDPD-PF w/incls





DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

OFFICE OF THE SECRETARY

WASHINGTON, D.C. 20540

NOV 5 1976

Lieutenant General J. W. Morris
Chief of Engineers
Department of the Army
Washington, D.C. 20314

Attn: DAEN-CWP-A

Dear General Morris:

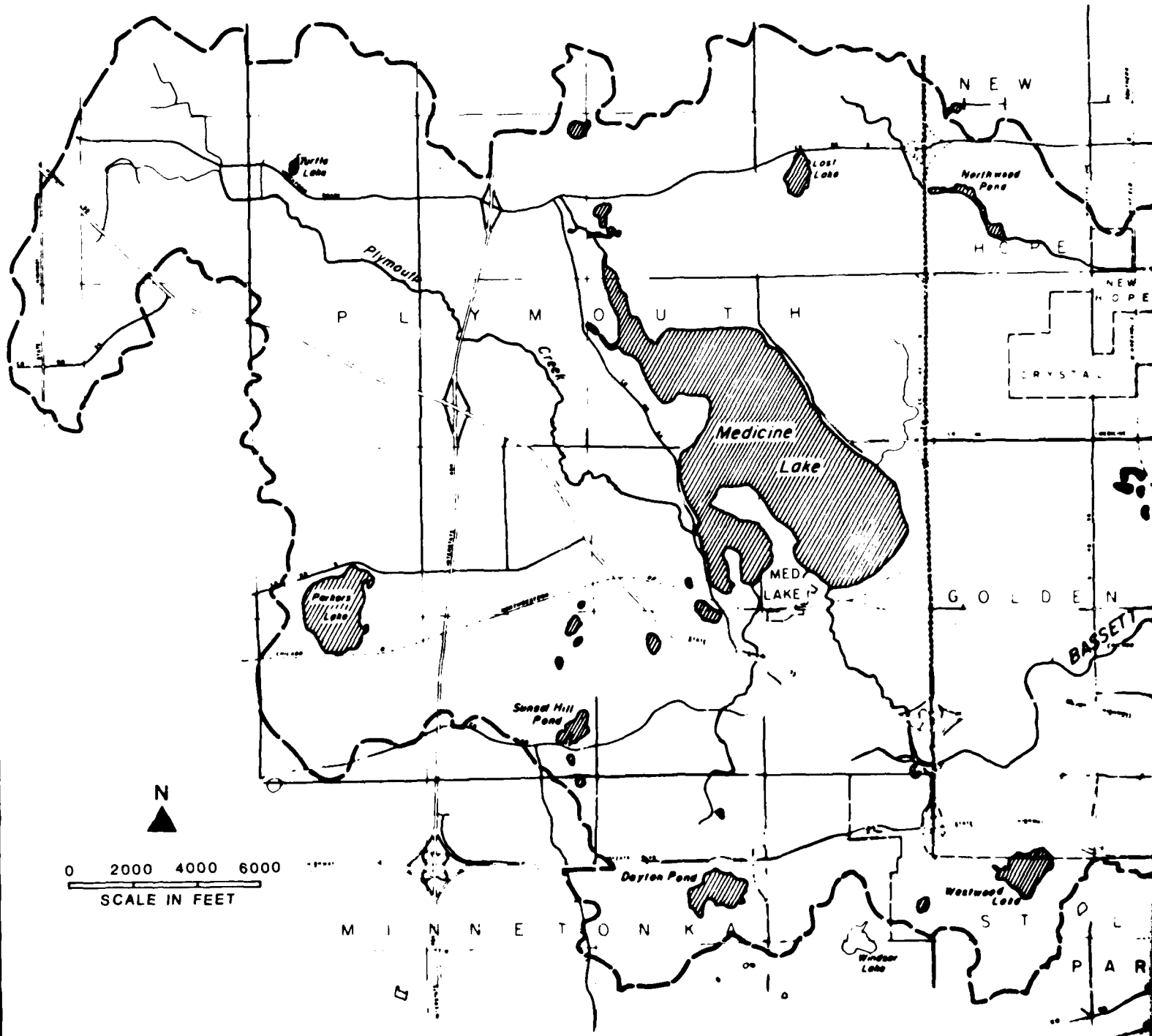
We acknowledge receipt of the following draft environmental impact statements:

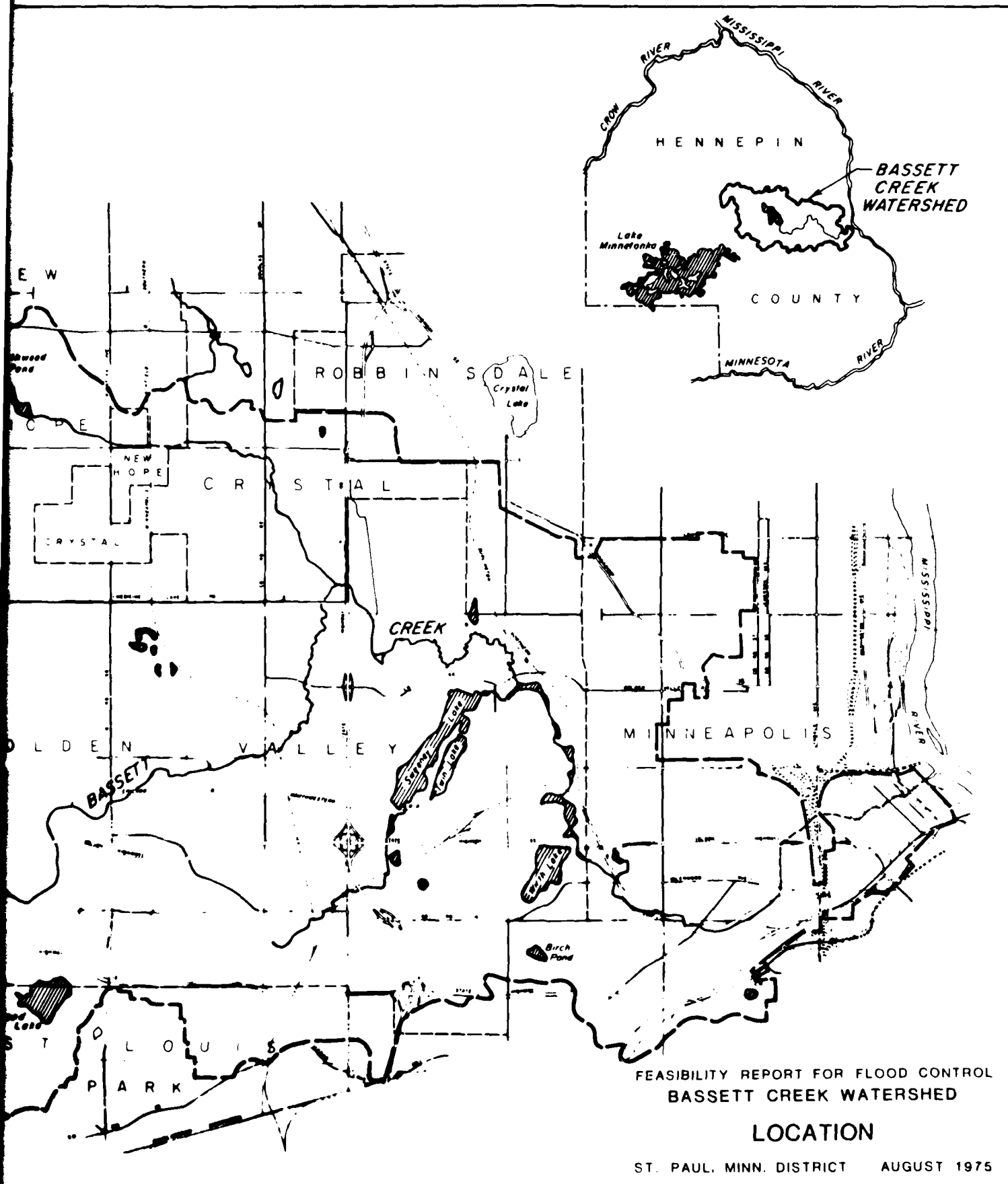
1. Bassett Creek Watershed, Hennepin County, Minnesota
2. Root River Basin, Minnesota
3. Urban Water Damage Study, Chicago Underflow Plan, Illinois
4. Mermentau River-Gulf of Mexico Navigation Channel, Louisiana

Although we will not be submitting comments for these draft EIS's, we appreciate the opportunity to review the documents. We would like to continue to receive all future environmental impact statements that your Department prepares.

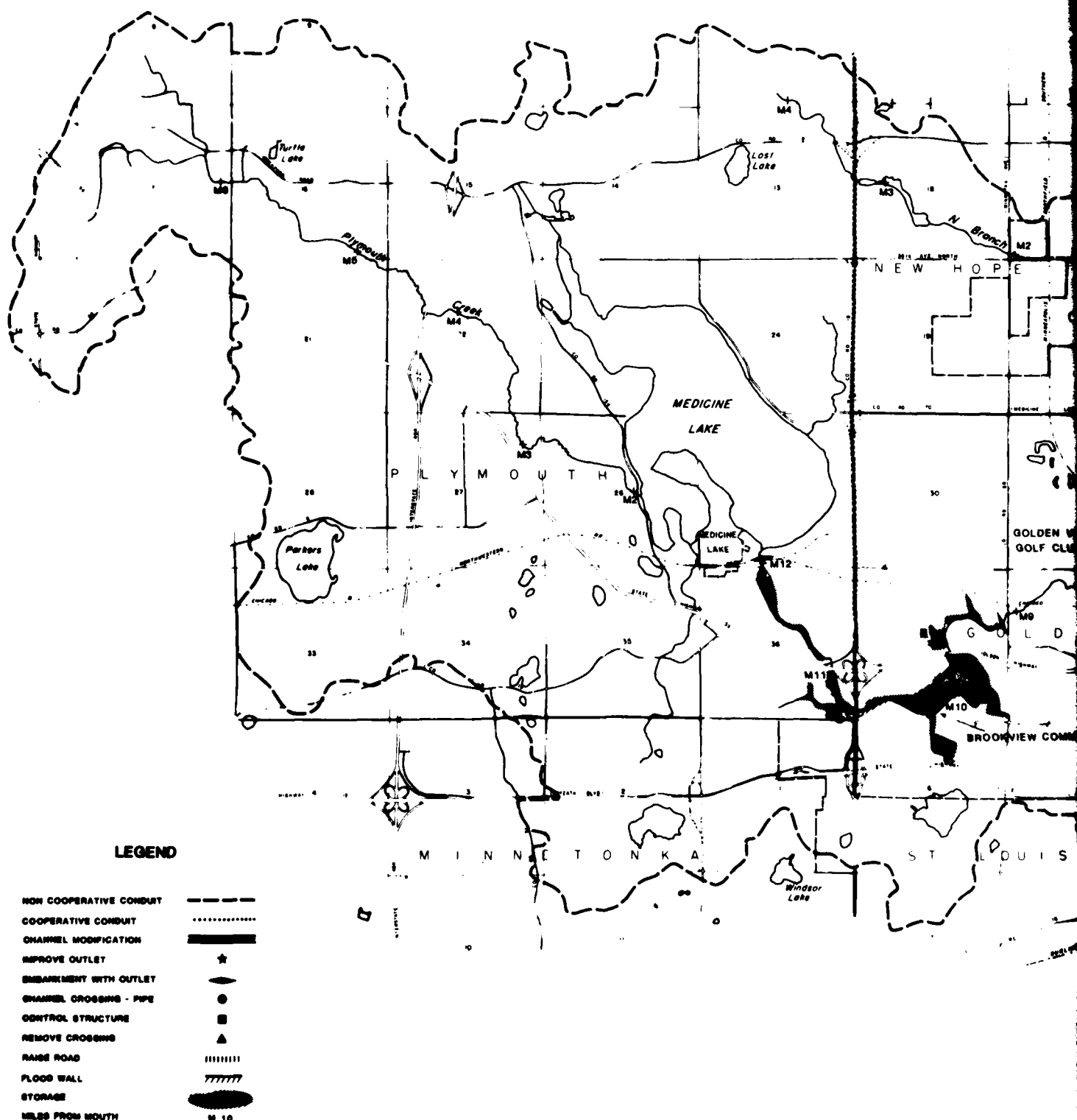
Sincerely,

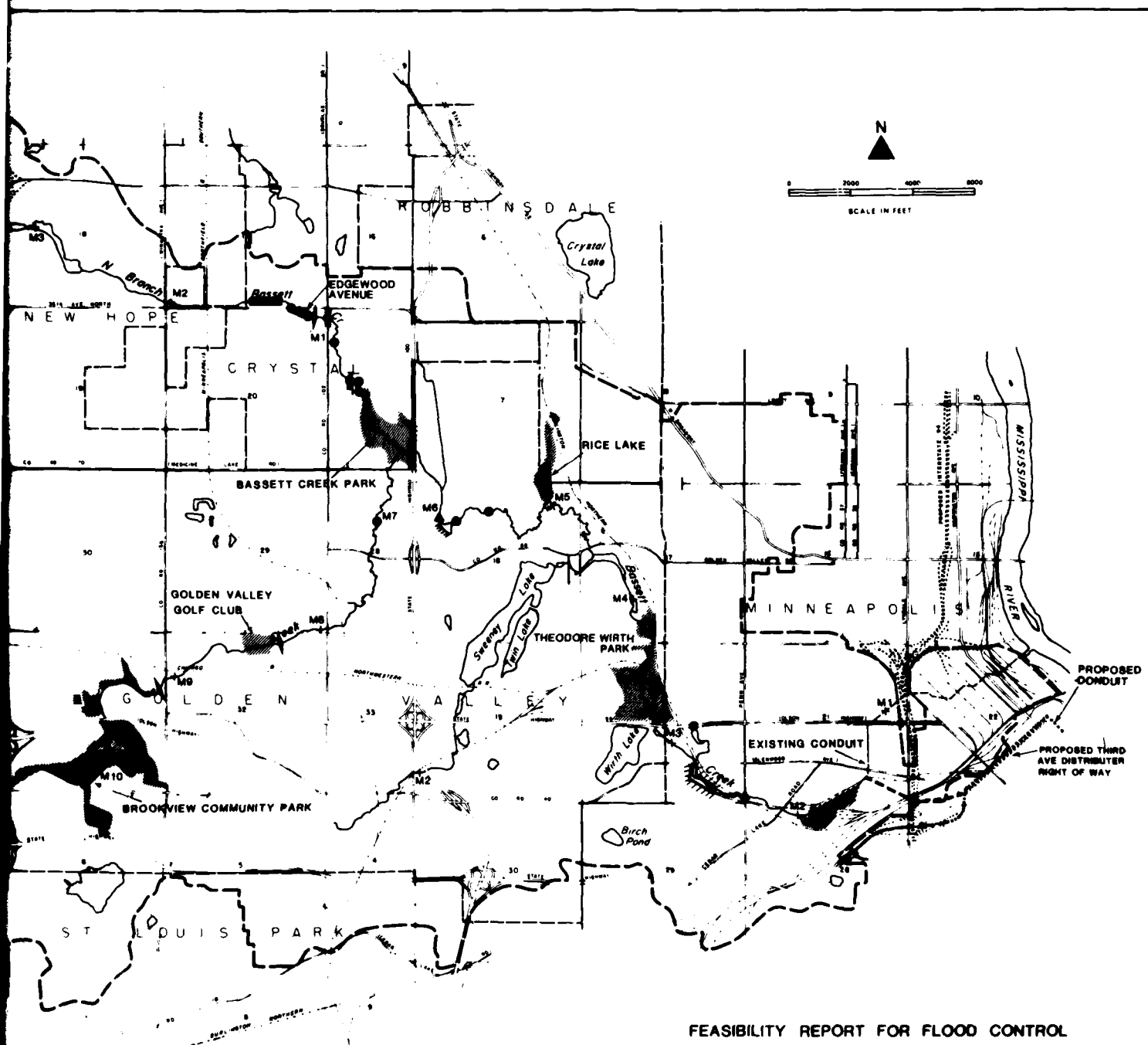
Charles Custard
Director
Office of Environmental Affairs





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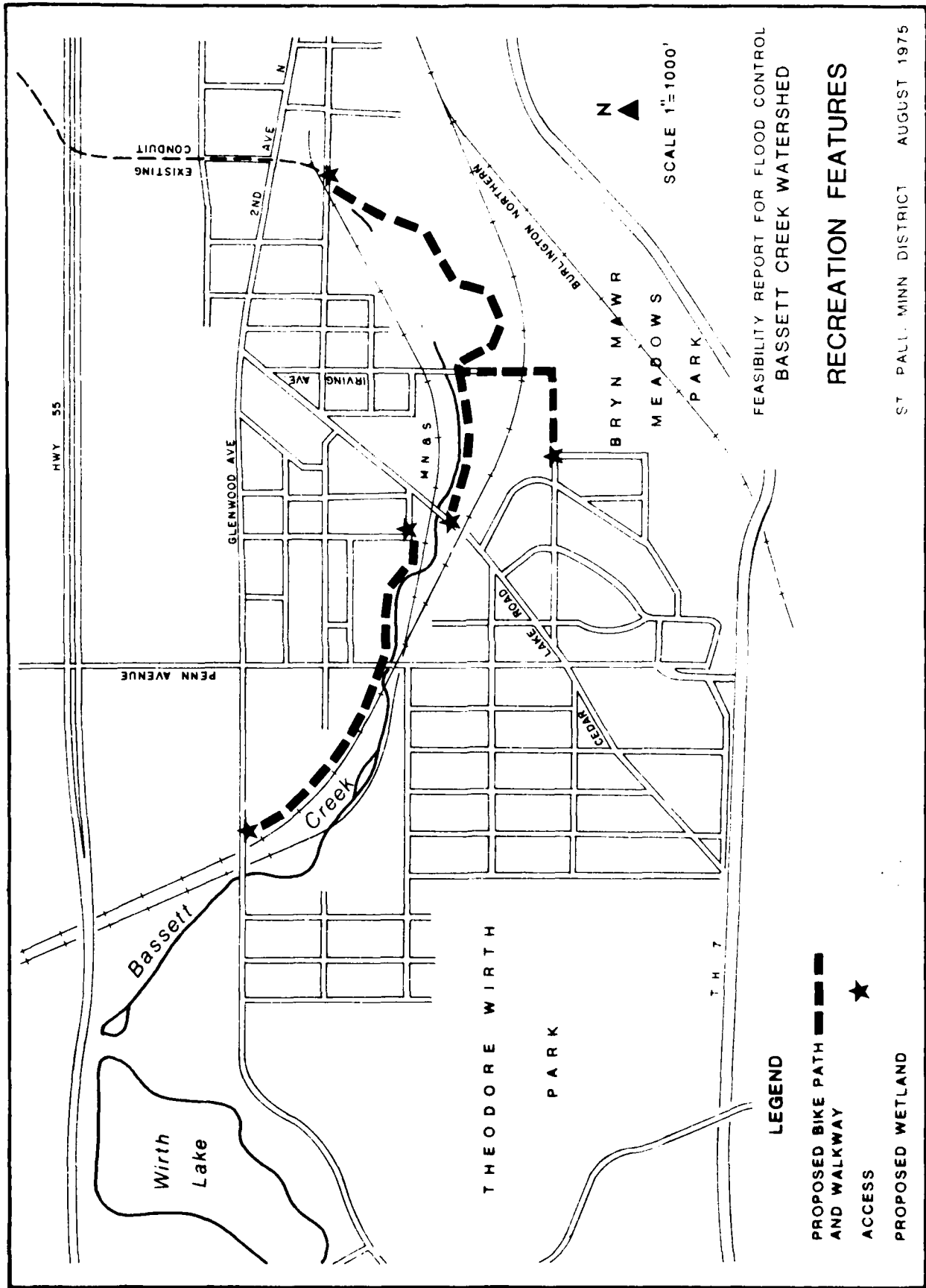




FEASIBILITY REPORT FOR FLOOD CONTROL
BASSETT CREEK WATERSHED

SELECTED PLAN

ST. PAUL MINN. DISTRICT
FILE NO. M35.1 - R - 5/15 MARCH 1976



ST. PAUL MINN. DISTRICT AUGUST 1975

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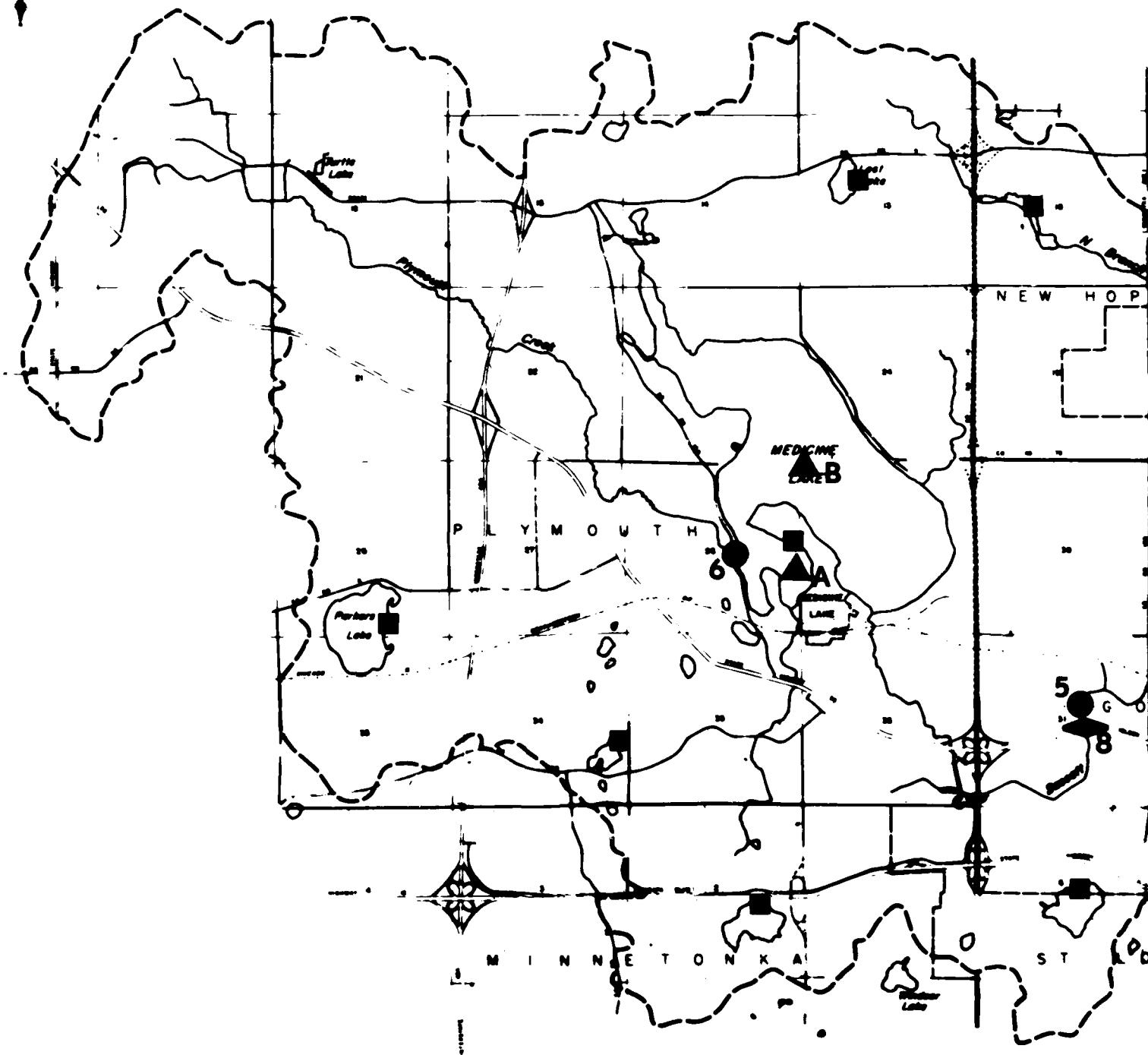
ST. PAUL DISTRICT, CORPS OF ENGINEERS
DEPARTMENT OF THE ARMY

REVISED DRAFT
ENVIRONMENTAL IMPACT STATEMENT
FLOOD CONTROL
BASSETT CREEK WATERSHED
HENNEPIN COUNTY
MINNESOTA

APPENDIX A

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CORPS OF ENGINEERS ST PAUL MN ST PAUL DISTRICT
FLOOD CONTROL. BASSETT CREEK WATERSHED, HENNEPIN COUNTY, MINNES--ETC(U)
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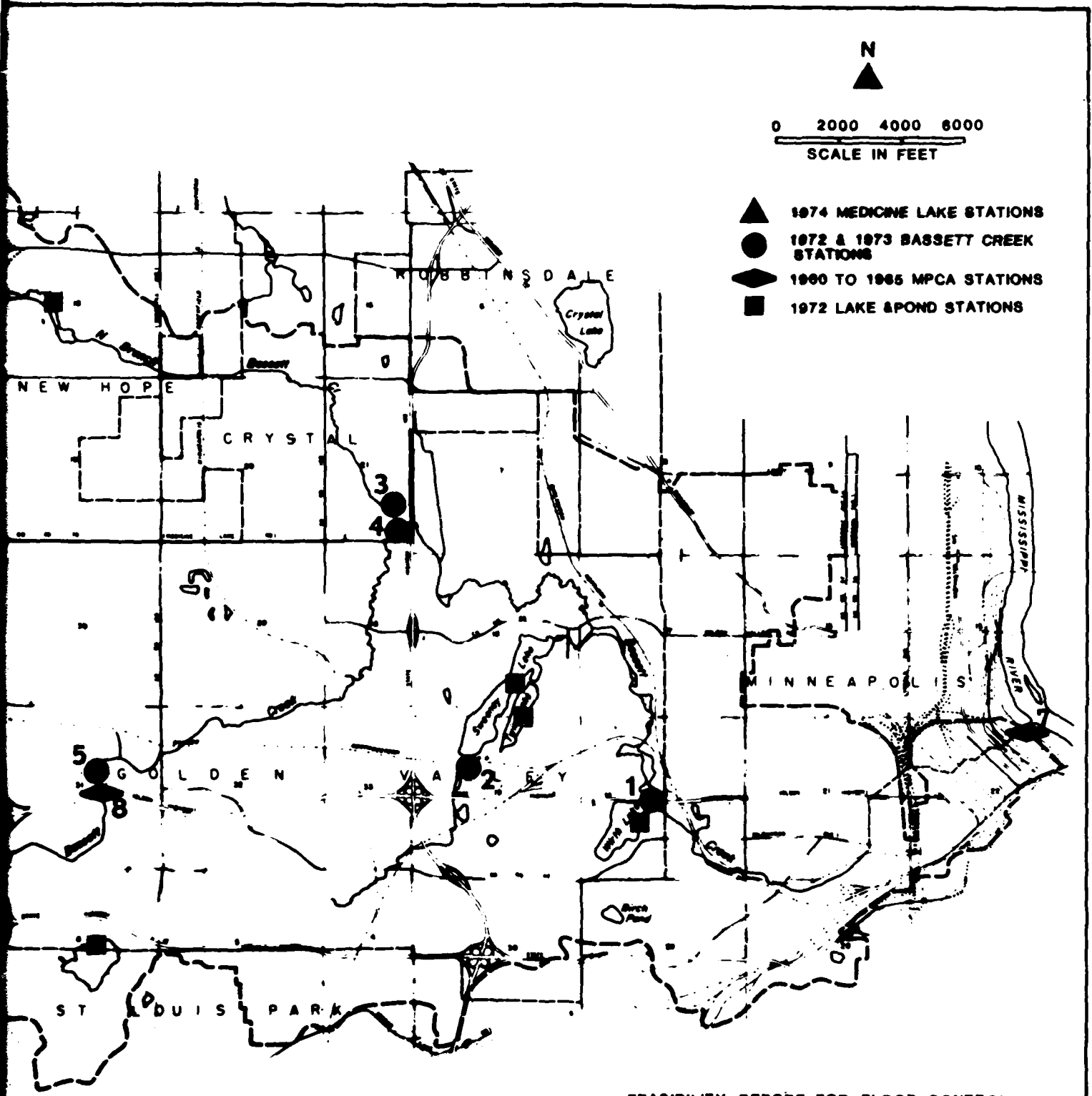
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FEASIBILITY REPORT FOR FLOOD CONTROL
BASSETT CREEK WATERSHED

WATER QUALITY SAMPLING STATIONS

ST. PAUL, MINN. DISTRICT AUGUST 1975

WATER QUALITY STANDARD FOR BASSETT CREEK
2B CLASSIFICATION

<u>Parameter</u>	<u>Limit</u>
Dissolved Oxygen	not < 6 mg/l April 1 - May 30 not < 5 mg/l any other time
Temperature	5°F above natural ¹ - streams 3°F above natural ¹ - lakes
Ammonia (N)	1 mg/l
Chromium (Cr)	0.05 mg/l
Copper (Cu)	0.01 mg/l
Cyanides (NC)	0.02 mg/l
Oil	0.5 mg/l
pH	6.5 - 9.0
Phenols	0.01 mg/l
Turbidity	25 Jackson Units
Fecal coliform	200/100 ml of sample
Radio-active material	Not to exceed the lowest concentration permitted by the authority having control over their use.

¹Based on monthly average of the maximum daily temperature except in no case shall it exceed the daily average temperature of 89°F.

Source: Minnesota Pollution Control Agency, Rules and Regulations,
WPC 14, October 4, 1973.

Bennett Creek Water Quality

(1) Station	Date	Temp. of.	(2) FCC/100ml	(2) DO mg/l	pH	(2) Total P mg/l	(2) NO ₃ -N mg/l	(2) Cl mg/l	(2) J10	(2) SS mg/l
1	6/12/72	69.0	32	6.2	6.9	0.115	1.26	40	11	20
	8/28/72	70.0	260	5.8	7.6	0.11	1.30	40	110	20
	10/25/72	42.5	14	6.0	7.2	0.21	0.21	60	5	10
	5/8/73	54.0	60	6.5	7.4	0.076	0.97	53	1.8	17
	6/14/73	75.0	183	5.3	8.0	0.040	0.42	42	16	33
	7/10/73	79.0	229	4.6	7.8	0.060	0.32	53	6.6	34
	8/7/73	67.0	44	4.5	7.9	0.210	0.06	42	16	29
	9/27/73	51.0	836	6.1	7.5	0.239	0.23	25	27	40
	10/26/73	51.0	490	6.9	7.5	0.103	0.96	30	13	11
	11/19/73	35.0	50	12.5	7.7	0.070	0.26	53	6.5	3
	12/4/73	34.0	< 10	13.0	7.7	0.150	0.20	85	13	23
2	6/12/72	60.5	12	4.8	7.6	0.121	1.15	110	9	1
	8/23/72	61.0	80	6.3	7.9	0.136	0.70	70	75	20
	10/25/72	49.5	14	7.9	7.5	0.600	0.86	89	4	10
	5/8/73	53.0	440	7.3	7.2	0.090	0.41	93	2.3	3
	6/14/73	63.0	588	5.0	7.8	0.079	0.61	95	5.5	16
	7/10/73	72.0	224	1.9	7.7	0.209	0.65	85	2.5	24
	8/7/73	73.0	20	2.8	7.7	0.240	0.36	62	4.3	1
	9/27/73	57.0	244	4.8	7.8	0.170	0.06	23	4	6
	10/26/73	47.0	120	5.6	7.9	0.200	0.02	80	6	13
	11/29/73	34.0	< 10	10.6	7.6	0.050	0.39	86	24	45
	12/18/73	33.0	< 10	9.3	7.6	0.050	0.91	126	6	7

Emmett Creek Water Quality (Continued)

(1) Station	Date	Temp. °F.	(2) FCC/100ml	(2) DO mg/l	pH	(2) Total P mg/l	(2) NO ₃ -N mg/l	(2) Cl mg/l	(2) JTU	(2) SS mg/l
3	6/12/72	70.5	161	6.8	7.4	0.302	0.56	80	20	60
	8/23/72	75.0	410	7.8	7.6	0.226	0.30	40	140	22
	10/25/72	43.0	4	8.8	7.2	0.200	0.10	40	23	43
	5/3/73	56.0	80	7.4	7.2	0.170	0.98	70	18	21
	6/14/73	72.0	312	2.4	7.17	0.130	0.63	53	16	45
	7/19/73	72.0	744	3.7	7.5	0.180	0.21	53	18	78
	8/17/73	78.0	40	7.8	7.4	0.160	0.21	42	34	86
	9/27/73	59.0	572	7.0	7.1	0.250	0.34	16	32	63
	10/26/73	51.0	70	7.8	7.5	0.120	0.68	40	20	46
	11/29/73	37.0	50	11.5	7.9	0.160	0.12	43	19	24
	12/14/73	34.0	110	10.7	7.7	0.100	0.61	53	2.6	4
4	6/12/72	64.0	500	7.5	7.4	0.236	0.45	100	15	46
	8/23/72	65.0	160	8.5	7.6	0.216	0.40	50	80	27
	10/25/72	43.0	4	11.2	8.1	0.140	0.82	30	5	13
	5/8/73	54.0	310	8.3	7.4	0.140	0.94	46	5.1	27
	6/14/73	65.0	372	6.0	8.0	0.110	1.08	31	7.9	26
	7/19/73	68.0	772	6.3	8.0	0.110	0.51	21	10	3.7
	8/17/73	69.0	48	7.9	8.0	0.210	0.38	31	19	28
	9/27/73	58.0	312	8.8	7.6	0.260	0.45	32	17	15
	10/26/73	50.0	160	10.1	8.0	0.150	0.08	20	1.7	4
	11/29/73	35.0	10	13.4	7.9	0.120	0.73	64	16	45
	12/14/73	33.0	10	7.2	7.6	0.150	0.45	53	0.7	2

(Continued)

Station	Date	Temp.	Wind	Dir.	Force	Clouds	Pressure	Humidity	Visibility	Remarks
5	6/12/72	66.5	96		6.1	7.6	0.246	0.86	10	
	8/12/72	66.0	100		6.5	7.7	0.245	0.40	10	
	10/15/72	46.0	<		6.5	7.7	0.243	1.44	10	
	5/1/73	55.0	70		6.2	7.1	0.240	1.60	10	
	6/14/73	66.0			6.2	7.0	0.240	0.43	10	
	7/10/73	66.0			6.2	7.7	0.240	0.43	10	
	7/17/73	66.0	120		6.3	7.7	0.240	0.43	10	
	8/1/73	67.0	160		6.6	7.7	0.240	0.52	10	
	10/10/73	66.0	160		7.6	7.9	0.240	0.15	10	
	11/14/73	35.0	<		10.4	7.6	0.140	0.25	11	
	12/1/73	33.0	<		6.9	7.6	0.240	0.64	11	
6	6/12/72	63.5	700		6.5	7.5	0.240	0.56	10	
	8/1/72	68.0	460		6.1	7.5	0.140	0.40	13	
	10/15/72	37.0	4		9.4	7.5	0.600	0.43	14	
	5/2/73	51.0	0		6.0	7.0	0.600	0.35	10	
	6/14/73	70.0	166		6.0	7.7	0.320	0.24	10	
	7/10/73	72.0	140		4.1	7.6	0.500	0.57	10	
	8/7/73	56.0	12		2.9	7.5	0.920	0.05	10	
	9/27/73	55.0	480		6.0	7.3	0.200	0.41	12	
	10/26/73	47.0	70		1.6	7.9	0.200	0.60	10	
	11/19/73	34.0	10		9.2	7.6	0.100	0.56	16	
	12/8/73	35.0	20		4.0	7.5	0.050	0.43	14	

Runyon Creek Water Quality (Continued)

(1) Station	Date	Temp. oF.	(2) FCC/100ml	(2) DO mg/l	pH	(2) Total P mg/l	(2) NO ₃ -N mg/l	(2) Cl mg/l	(2) JFU	(2) SS mg/l
7	2/10/60	45		6.0	8.0			45	11	24
	3/16/60	46		8.0	7.7			40	6	13
	2/24/60	66		5.3	7.6		0.16	13	30	82
	6/27/60	69		6.0	8.1		0.24	13	11	27
	7/12/60	73		6.2	9.4		0.24		7	14
	8/13/60	65		5.8	7.5		0.20	14	26	52
	9/29/60	59		7.8	7.1		0.04	7	7	15
	10/18/60	54		3.8	7.6		1.70	24	16	52
	12/22/60	33		9.3	7.9		0.34	25	7	31
	2/12/61	52			7.7		2.4	18	13	18
	3/11/61	53		8.2	8.2		0.36	25	14	16
	7/21/61	74		7.8	8.0		0.02	11	12	23
	8/29/61			5.1	7.9		0.16	28	15	21
	7/25/62	67		5.4	8.1		0.20	5	30	52
	9/10/62	62		6.0	7.7		0.24	10	25	30
	11/2/62	45		5.4	8.4		0.20	19	2	6
	2/27/63	36		5.8	8.2	0.19	1.70	33	15	6
	6/28/63	74		6.3	7.3	0.27	0.29	21	30	78
	7/11/63	76		5.0	7.6	0.25	0.24	17	30	42
	11/4/63	50	54,000	8.7	7.7	0.19	1.10	24	10	5
	5/6/64	60	7,200	5.8	8.3	0.22	0.22	12	15	18
	6/3/64	56	500	6.6	7.9	0.18	0.42	8	8	4
	6/20/64	79	800	6.5	8.1	0.22	0.18	8	23	22
	6/18/64	78	3,300	7.0	7.7	0.22	0.12	10	24	27
	9/15/64	57	35,000	6.9	9.4	0.21	0.48	34	22	33
	10/27/64	58	17,000	7.1	7.9	0.27	0.30	15	12	8
	3/4/65	55	40,000	7.6	7.8	0.27	0.60	19	12	36
	7/1/65	63	490,000	5.7	7.1	0.74	0.90	31	30	10
	8/22/65	69	2,300	7.0	7.5	0.24	0.21	23	100	35
	10/22/65		3,200	9.5	7.9	0.02	0.34	21	11	11

Bassett Creek Water Quality (Continued)

(1) Station	Date	Temp. °F.	(2) FCC/100ml	(2) DO mg/l	PH	(2) Total P mg/l	(2) NO ₃ -N mg/l	(2) Cl mg/l	(2) JFU	(2) SS mg/l
8	3/16/60	36		7.8	8.0			50	12	12
	5/24/60	66		7.6	7.8		0.08	10	20	41
	6/15/60	75		8.6	8.3		0.22	11	10	19
	7/18/60	78		7.1	7.7		0.06	9	13	26
	8/16/60	71		4.1	7.7		0.20	16	18	30
	9/29/60	57		6.7	7.1		0.14	16	45	44
	10/18/60	52		7.1	7.7		0.16	16	17	50
	12/22/60			22.5	7.8		0.14	10	10	22
	2/23/61	35		12.2	7.6		0.16	100	20	26
	4/12/61	48		11.1	8.1		0.16	18	20	32
	7/11/61	76		5.8	7.4		0.04	18	20	58
	8/30/61			7.9	7.0		0.04	32	13	23
	7/24/62	68		3.2	7.1		0.10	4	10	11
	9/11/62	64		5.6	7.4		0.10	18	25	14
	11/7/62	38		8.5	8.4	0.13	0.10	19	9	14

FOOTNOTES FOR BASSETT CREEK WATER
QUALITY TABLE

Note

1.

Station #

1. North of T.H. 55 in Theodore Wirth Park
2. Inlet to Sweeney Lake
3. North Branch at Zane Avenue North
4. Main Stem at Zane Avenue North
5. Main Stem Near T.H. 55 in Golden Valley
6. Plymouth Creek at Medicine Lake
7. Main Stem at Mississippi River
8. Main Stem at T.H. 55 in Golden Valley

2. FCC/100ml Fical Colform Colonies per 100 ml

DO Dissolved Oxygen

Total P Total Phosphorous

NO3-N Nitrate nitrogen

Cl Chlorides

JTU Jackson Turbidity Units

SS Suspended Solids

1972 LAKE WATER QUALITY

Water Chemistry Data

Lake	Date	Depth Meters	Total P µg/l	PO ₄ -P µg/l	(1) NO ₃ -N µg/l	(2) NH ₄ -N µg/l	(3) SO ₄ mg/l	Cl mg/l	Ca mg/l	Mg mg/l	pH
Sweeney	5-23	1.0	66	35	21	47	70	93	43	1	8.4
	6-10	1.0	55	28	1						
		7.5	740	698	4						
	10-17	1.0	97	48	47	332					
		7.5	101	70	43	332					
Twin	5-25	1.0	45	14	23	48	64	50	36	13	8.0
	8-10	1.0	23	12	1						
		3.0	65	13	2						
	10-17	16.0	970	934	6						
		1.0	20	5	3	32					
		5.0	53	19	42	31					
		15.0	477	430	27	1,380					
Medicine Station A	6-1	1.0	35	15	1	25	18	36	24	17	8.0
	8-16	1.0	68	60	6						
		5.0	48	13	5						
	10-19	10.0	548	427	5						
		1.0	72	23	27	70					
		5.0	61	27	34	76					
		10.0	85	62	26	98					
Medicine Station B	6-1	1.0	40	35	2	132	10	5	17	14	8.0
	8-16	1.0	92	40	5						
		5.0	45	45	6						
	10-19	12.0	750	468	7						
		1.0	99	62	24	170					
		5.0	104	50	34	147					
		10.0	60	40	16	7					

1972 LAKE WATER QUALITY (Continued)

Water Chemistry Data

Lake	Date	Depth Meters	Total P mg/l	(1) PO ₄ -P mg/l	(1) NO ₃ -N mg/l	(1) NH ₄ -N mg/l	(1) SO ₄ mg/l	Cl mg/l	Ca mg/l	Mg mg/l	Na mg/l	K mg/l
Parkers	6-1	1.0	68	47	2	70	18	30	24	24	34	4.5
	8-15	1.0	50	40	3							
		5.0	60	95	2							
	10-0	10.0	830	810	5							
	10-19	1.0	94	23	258	237						
Wirth		6.0	94	58	270	325						
		9.5	102	42	272	238						
	5-25	1.0	93	47	30	80	70	90	45	28	34	3.8
	8-10	1.0	65	48	5							
	10-17	6.5	700	675	0							
Dayton Pond		1.0	138	70	49	640						
		6.0	121	70	55	481						
	5-2	0.5	37	15	135	20	<1	74	52	13	27.6	4.8
	5-22	0.5	167	80	15	111	<1	4.1	32	16	22.5	6.4
	5-22	0.0	245	100	10	203	29	84	77	22	42.5	3.9
Sunset Hill Pond	5-22	0.5	85	37	3	88	<1	60	22	11	27.6	3.0
	5-22	0.5	177	120	4	207	<1	49	50	18	22.5	2.4

(1) PO₄-P = phosphate phosphorus
 NO₃-N = nitrate nitrogen
 NH₄-N = ammonia nitrogen
 SO₄ = sulfate

SOURCE: Bassett Creek Flood Control Commission

1972 AND 1973 TEMPERATURE AND DISSOLVED OXYGEN PROFILES

FOR LAKES IN THE TASSETT CREEK WATERSHED

	6/1/72			8/16/72			10/19/72			2/11/73		
	Depth (Meters)	Temp. (°C)	D.O.	Depth (Meters)	Temp. (°C)	D.O.	Depth (Meters)	Temp. (°C)	D.O.	Depth (Meters)	Temp. (°C)	D.O.
Medicine Lake Station A	0.0	20.6	9.1	0.0	24.5	10.6	0.0	6.0	9.9	0.0	.6	11.8
	.5	--	9.1	.5	--	10.7	.5	--	9.9	1.0	1.1	--
	1.0	20.7	9.4	1.0	25.2	10.7	1.0	6.0	9.9	3.0	2.4	--
	3.0	19.1	7.3	3.0	26.6	8.2	3.0	6.0	9.9	5.0	2.5	5.7
	5.0	14.7	3.2	5.0	21.9	4.1	5.0	6.5	--	7.0	3.4	.8
	7.0	11.4	--	7.0	20.1	.2	7.0	6.5	9.8	9.0	3.7	1.1
	10.5	7.1	--	10.0	15.4	--	10.0	5.5	9.9	11.0	6.3	--
Medicine Lake Station B	0.0	--	8.2	0.0	23.2	11.5	0.0	6.5	5.5	0.0	.5	--
	.5	--	8.5	.5	--	11.6	.5	--	8.5	1.0	.5	9.4
	1.0	--	8.4	1.0	23.5	11.6	1.0	7.0	3.5	3.0	2.3	--
	3.0	--	8.3	3.0	23.6	7.7	3.0	6.5	6.5	5.0	2.4	4.5
	5.0	--	3.4	5.0	21.6	2.5	5.0	6.5	--	7.0	2.8	--
	7.0	--	.7	6.0	21.3	1.3	7.0	6.5	8.4	9.0	3.4	--
	11.0	--	--	12.0	10.6	--	10.0	4.8	8.2	11.0	3.8	--
										13.0	3.9	--
Parkers Lake	0.0	20.7	12.2	0.0	24.0	9.4	0.0	5.5	9.5	0.0	.9	--
	.5	--	12.6	.5	--	9.4	.5	--	9.7	1.0	1.8	8.1
	1.0	20.8	12.5	1.0	24.6	9.3	1.0	5.0	9.7	3.0	3.6	5.5
	3.0	19.6	9.2	3.0	21.9	5.8	3.0	4.5	9.7	5.0	3.6	3.6
	5.0	13.4	1.2	5.0	18.9	--	6.0	6.0	9.6	7.0	3.7	1.4
	7.0	8.9	--	10.0	9.4	--	9.5	5.5	9.2	8.5	3.9	--
	10.0	6.9	--									

1972 and 1973 TEMPERATURE AND DISSOLVED OXYGEN PROFILE
FOR LAKES IN THE DASSETT CREEK WATERSHED (continued)

	5/25/72				8/16/72				10/17/72			
	Depth (Meters)	Temp. (°C)	D.O.	Depth (Meters)	Temp. (°C)	D.O.	Depth (Meters)	Temp. (°C)	Depth (Meters)	Temp. (°C)	D.O.	Depth (Meters)
Sweeney Lake	0.0	22.6	9.5	0.0	20.5	8.3	0.0	8.7	0.0	9.6	—	0.0
	.5	--	9.3	.5	--	8.5	.5	--	.5	9.3	—	1.0
	1.0	22.5	9.4	1.0	20.5	8.4	1.0	8.5	1.0	9.4	—	3.0
	3.0	19.5	12.1	3.0	20.1	6.4	3.0	6.5	3.0	9.3	—	4.0
	5.0	11.6	.12	5.0	19.1	.8	5.0	8.5	5.0	9.3	—	5.0
	8.0	8.2	0.0	7.5	11.4	--	7.5	7.5	7.5	9.3	—	6.0
Twin Lake	0.0	22.3	8.6	0.0	21.2	8.5	0.0	9.5	0.0	7.9	—	0.0
	1.0	22.4	8.4	1.0	21.0	8.5	1.0	9.0	1.0	7.9	—	1.0
	3.0	19.6	11.2	3.0	21.0	8.5	3.0	9.0	3.0	7.3	—	3.0
	5.0	12.2	15.9	5.0	21.1	9.0	5.0	9.0	5.0	7.3	—	5.0
	8.0	8.5	.7	7.0	11.6	1.2	7.0	9.0	7.0	--	—	7.0
	10.0	6.3	0.0	10.0	7.9	--	10.0	7.0	10.0	7.3	—	10.0
Wirth Lake	15.0	4.9	0.0	16.0	6.2	--	16.0	4.0	15.0	1.9	—	15.0
	0.0	23.3	10.7	0.0	20.4	7.8	0.0	8.0	0.0	8.4	—	0.0
	.5	--	10.7	.5	--	7.8	.5	--	.5	8.4	—	1.0
	1.0	21.6	10.5	1.0	20.3	7.7	1.0	8.0	1.0	8.6	—	3.0
	3.0	19.1	0.8	2.0	20.2	7.6	3.0	8.0	3.0	8.2	—	5.0
	5.0	13.0	0.1	4.0	19.9	3.7	6.0	8.0	6.0	7.6	—	7.0
	7.0	8.8	0.0	6.5	12.9	--						

1972 Primary Production, Chlorophyll Concentration and Secchi Disc Readings
(grams carbon/m²/day)

	<u>5/1/72</u>	<u>8/12/72</u>	<u>10/14/72</u>
Medicine Lake			
Station 1	1.1	0.	1.1
Station 2	0.6	0.1	0.9
Parkers Lake		<u>8/12/72</u>	<u>10/23/72</u>
	2.9	1.9	0.1
Sweeney Lake	<u>10/2/72</u>	<u>10/17/72</u>	<u>10/17/72</u>
	1.1	1.7	0.1
Twin Lake	2.2	0.5	0.1
Wirth Lake	2.4	2.1	3.2

CHLOROPHYLL CONCENTRATION (ug/m³)

	<u>5/1/72</u>	<u>8/12/72</u>	<u>10/19/72</u>
Medicine Lake			
Station 1	0.1	101.6	45.7
Station 2	3.5	191.5	48.6
Parkers Lake		<u>8/12/72</u>	<u>10/20/72</u>
	45.6	20.6	33.9
Wirth Lake	<u>5/23/72</u>	<u>8/10/72</u>	<u>10/17/72</u>
	35.1	60.1	60.4
Twin Lake	3.5	5.1	8.6
Sweeney Lake	10.1	38.2	50.0

SECCHI DISC READING (meters)

	<u>6/1/72</u>	<u>8/16/72</u>	<u>10/19/72</u>
Medicine Lake			
Station 1	2.8	.6	1.1
Station 2	3.7	.9	1.3
Parkers Lake		<u>8/15/72</u>	<u>10/20/72</u>
	1.1	1.1	1.9
Wirth Lake	<u>5/23/72</u>	<u>8/10/72</u>	<u>10/17/72</u>
	.5	.6	1.0
Twin Lake	4.5	3.4	3.7
Sweeney Lake	2.2	1.9	2.1

Source: Cassatt Creek Flood Control Commission

1974 MEDICINE LAKE WATER QUALITY

Date	Depth (Meters)	Temperature (°C)	Dissolved Oxygen (mg/l)	Chlorophyll (mg/m ³)	Conductivity (µmho/cm ²)	Reactive Phos- phorus (µg/l)	Total Phos- phorus (µg/l)
March 25		STATION A					
	0	1.1	10.3		237		
	1	4.6	12.5		402	12	27
	3	4.1	11.6		437		
	5	3.7	11.6		449		
	7	3.8	6.1		456	27	45
	8	4.1	--		461		
		STATION B					
	0	1.1	10.0		357		
	1	3.9	10.2		400	22	77
	3	3.7	7.8		445		
	5	3.2	5.5		451	23	42
	7	3.4	4.2		451		
	9	3.4	1.6		476	32	85
	11	3.8	0.6		492		
	13	4.1	--		533	107	243
April 25		STATION A					
	0	11.4	11.3		395		
	1	8.9	12.5	22	396	30	78
	3	8.1	--		399		
	5	7.9	10.8		398	28	63
	7	7.9	--		398		
	9	7.8	10.0		399	13	56
	10	7.8	9.8		399		
		STATION B					
	0	10.4	11.1		392		
	1	8.5	11.4	29	392	26	63
	3	8.3	--		393		
	5	7.8	9.9		394	23	60
	7	7.6	--		396		
	9	7.6	9.5		396	26	65
	11	6.7	--		401		
	13	6.6	7.9		404	26	56

Source: Bassett Creek Flood Control Commission

1974 MEDICINE LAKE WATER QUALITY (cont.)

Date	Depth (Meters)	Temperature (°C)	Dissolved Oxygen (mg/l)	Chlorophyll (mg/m ³)	Conductivity (umho/cm ²)	Reactive Phos- phorus (ug/l)	Total Phos- phorus (ug/l)
June 19							
				STATION A			
	0	22.9	10.6		366		
	1	20.0	--	27	363	28	73
	3	18.9	8.9		372		
	5	18.1	7.3		369	28	55
	7	18.1	6.1		370		
	9	17.9	4.0		369	45	128
STATION B							
	0	22.0	10.8		361		
	1	20.0	--	32	360	30	78
	3	19.4	9.3		358		
	5	18.6	6.5		364	35	63
	7	15.5	3.5		373		
	9	10.0	--		426	73	120
	11	--	0		--		
	13	9.3	--		433		
August 15							
				STATION A			
	0	23.3	8.0		363		
	1	23.1	8.1	63	362	50	105
	3	23.0	8.0		362		
	5	22.5	6.9		365	75	78
	7	21.7	4.8		371		
	9	21.4	--		375	90	138
STATION B							
	0	23.3	8.9		361		
	1	23.1	8.7	62	362	48	88
	3	23.0	8.2		362		
	5	21.7	3.6		371	53	73
	7	18.7	0		385		
	9	12.1	--		448	305	500
	10	11.6	--		449		
	11	11.3	--		454		

Source: Bossett Creek Flood Control Commission

Advisory Council
On Historic Preservation
1522 K Street N.W.
Washington, D.C. 20005

March 2, 1976

Mr. E. Dean Carlson
Division Administrator
Federal Highway Administration
Suite 490, Metro Square Building
St. Paul, Minnesota 55101

Dear Mr. Carlson:

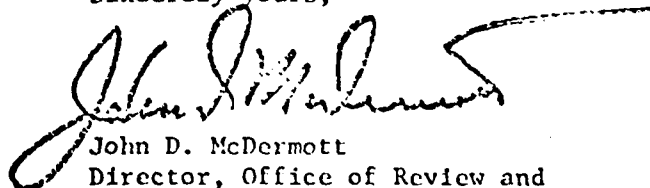
On February 2, 1976, the Advisory Council received an adequately documented determination from the Federal Highway Administration (FHWA) that SP 2731 (I-94) Bassett Creek Relocation Tunnel, Minneapolis, Minnesota, would not adversely affect the Saint Anthony Falls Historic District, a property included in the National Register of Historic Places. After review of your determination, the Executive Director notes no objection to the determination of no adverse effect, provided that should structural remains of the early four and lumber mill activity be discovered during the tunneling operations construction operation will be halted at that location and Mr. Russell Fridley notified immediately so that his staff may examine them in order to determine their significance.

In accordance with Section 800.4(d) of Advisory Council's "Procedures for the Protection of Historic and Cultural Properties" (36 C.F.R. Part 800), you may proceed with the undertaking.

A copy of your determination of no adverse effect, along with supporting documentation and this concurrence, should be included in any environmental assessment or statement prepared for this undertaking in compliance with the National Environmental Policy Act.

Your continued cooperation is appreciated.

Sincerely yours,



John D. McDermott
Director, Office of Review and
Compliance

A-15

The Council is an independent unit of the Executive Branch of the Federal Government charged by the Act of October 15, 1966 to advise the President and Congress in the field of Historic Preservation.

UNIVERSITY OF MINNESOTA
TWIN CITIES

Department of Anthropology
215 Ford Hall
Minneapolis, Minnesota 55455

January 13, 1976

Col. Max Noah
Corps of Engineers, St. Paul District
Permits and Statistics Branch
U. S. Post Office Building
St. Paul, Minnesota 55101

Dear Col. Noah:

I have read the report "Archaeological Reconnaissance, Bassett Creek Watershed Flood Control Project Area," submitted by Richard Anuskiewicz and Jeanne Schaaf and find it acceptable as an initial assessment of archaeological potential. I agree with the recommendations on page 3 which state that specific areas designated in the report need to be intensively tested, that temporary ponding areas must be surveyed and tested, and that an archaeologist should be present during all project activities involving areas which cannot be tested prior to construction.

Sincerely yours,



Christy A. H. Caine
Acting State Archaeologist

CAHC:bw
CC:Russell Fridley

15 JAN 1976

15 JAN 1976

